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SANITARY LANDFILLING

James E. Delaney

Environmental Protection Agency
Rockville, Maryland

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SANITARY LANDFILLING

Report on a Joint Conference sponsored by the
National Solid Waste Management Association
and the U.S. Environmental Protection Agency,
November 14-15, 1972, Kansas City, Missouri

These proceedings (SW-5p) were compiled
by JAMES E. DELANEY
for the Office of Solid Waste Management Programs

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FOREWORD

The primary objective of the two-day conference reported on in this publication was to provide an opportunity for State solid waste officials and representatives from the private and public sectors involved in the design and operation of sanitary landfill sites to have an open discussion and mutual exchange of ideas on questions of vital concern to both. We believe this objective was attained in an outstanding manner, thanks to the expertise and enthusiasm of all the speakers and floor commentators. We hope that all who attended will benefit from reading this publication and reviewing what was said. The conference also constituted the First Congress of the National Sanitary Landfill Institute of the National Solid Wastes Management Association (NSWMA).

Within the limitations outlined below, this report is a record of the remarks made by designated speakers both in their formal presentations and in response to questions from the floor. Also included are the comments of other participants who elaborated on or disagreed with some of the opinions voiced.

Because of the recording method employed, no claim is made that this report reflects with complete accuracy every word spoken from the podium or the floor. The reporter repeated into a tape recorder the words--as well as he could comprehend them--of each speaker and other participants, and the tapes were later used to produce a transcript. No prepared texts were available to check the accuracy and completeness of the transcript. Administrative announcements, "asides", and incomplete or repetitious comments have been deleted. Certain presentations depended on the use of slides to such a degree that little textual material was available. In these instances, a Synopsis is provided that is designed to cover, in a general way, the subject matter discussed. (These presentations are marked with an asterisk in the Contents pages.) All the substantive comments made by the speaker and other commentators in the ensuing question and answer session are reported. To preserve the "shirtsleeve" atmosphere that prevailed during the conference, no effort has been made to formalize the language used in the presentations.

The cooperative spirit of Eugene Wingerter, Executive Director, NSWMA, and his staff was instrumental in making the conference a success. Donald Townley and his staff in the EPA Kansas City Regional Office also provided valuable assistance in making the conference an event to remember. Finally, James Delaney, Writer-Editor of my staff, had the formidable task of editing the raw manuscript and putting the document into a usable form.

--JOHN T. TALTY
Office of Solid Waste Management Programs

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INTRODUCTORY REMARKS

John Vanderveld*

The response to this entire session is extremely gratifying. Initially it was set up to have 200 people, but the response was such that the number was expanded to 250, and we still had to turn away about 60 people which we could not accommodate.

The attendance at this conference has been a real first in the entire industry of solid waste management. We have represented in the room today members from legislative, planning, engineering, and operations in solid waste management.

We have representatives here from large areas as well as from smaller, rural areas. We have been working for a number of years in a very encouraging way and with the kind of relationship that really makes everything worthwhile. It really gives the kind of encouragement that a person needs in a relationship with the EPA and the private industry.

The private sector has been working in the operating end of the business and has been working in a real close partnership with representatives of government.

There is a wealth of talent going to be coming before you during this two-day period, and I think we have an excellent opportunity to share some of the problems, some of the ideas, some of the concepts that each of you have.

The way we can all gain in our expertise is by sharing our thoughts, sharing our problems, sharing our ideas. We'll have an opportunity for that during this two-day period.

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*Chairman, Sanitary Landfill Institute, NSWMA and Senior Vice President, Browning-Ferris Industries, Houston, Texas

David Dominick*

This institute is the first of its kind, jointly sponsored by EPA and the National Solid Wastes Management Association. It's a good example of the kind of public-private partnership that we need to see much more of.

The private sector can play, and in the past has played, an important role in solid waste management. I see an even expanded role for the private sector in the future. But it seems to me that in the past we have not given enough attention to the interplay between the public and the private sector.

We need to ensure that we have optimum efficiency in solid waste collection and disposal and adequate protection of the public interest.

What is this interplay? How can it be improved? I think that's one of the primary purposes of this meeting, particularly the interplay between the public and private sector at the State level.

I'm most pleased that in setting up this institute the decision was made to invite representatives of all the States. I'm very glad that most of the States are here, because I think that in some situations in the past, where there has been an absence of adequate regulatory authority, we have seen a situation develop where equal competition is not being fostered.

There are situations where the good operators are using proper methods and bearing the costs for those methods while a lot of other people are getting away with less than proper disposal practices. I think you need to examine the question of the role of government and particularly the role State agencies should play in ensuring equal competition in solid waste management.

I hope that your deliberations today and tomorrow will go beyond the technical aspects of sanitary landfill design and operation, important as those aspects are, and focus on some other important, very important issues as I see them.

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*Assistant Administrator for Categorical Programs, U.S. Environmental Protection Agency.

We're concerned about the adverse health, environmental, and related impacts, not only of traditional residential, commercial, and industrial wastes but of the many types of hazardous wastes which, as air and water pollution controls tighten, are being disposed of on the land.

We had a meeting the other day on implementation of the ocean-dumping legislation. As you know, the Congress passed legislation this year in four of the five areas that the Environmental Protection Agency and the Administration sought legislation. We got bills covering water pollution control, noise, ocean dumping, and pesticides. We did not get a bill in the toxic substance area. I hope we'll be able to get that reintroduced and passed by the next Congress.

But regarding the ocean-dumping bill and its implications, it will require a permit system and basically counting off immediately a number of highly hazardous wastes which in the past have been dumped into the ocean, such as chemical warfare agents and high-level radioactive wastes. Then, through the permit system, a reduction and a careful minimization of the amounts of materials going into the ocean are to be effected. Since we're cutting off the ocean as a repository for waste, where are those wastes going to go?

Additionally, we're beginning to tighten down very heavily in the air and water pollution control area.

We're picking up wastes from scrubbers. We're picking up wastes in our sludges. Where are these going to go? And the usual answer is into the land, into the land. How are we going to properly regulate that?

Please address those questions in this conference and the question of what you think should be done at the State and at the National level with regard to the increasingly hazardous materials that we're beginning to have to deal with as these other avenues of disposal are cut off.

We are frankly very disappointed that the regulatory progress of all but a very few States in even the non-hazardous waste area, much less adequate controls in areas of hazardous wastes, is practically non-existent.

I think that in terms of the resources that have been brought to bear, in terms of skilled administration in the regulatory area, and in terms of adequate performance in protecting public health and providing environmental protection, our solid waste management agencies are running a poor third to air and water pollution agencies. I think that we need to do something to reverse this situation, to bring adequate administration and attention into this area.

You State people have a massive job to do to correct this situation in your own States. You can work with one another, you can work with the Federal people, and you can certainly get some ideas from your counterparts here in the private sector.

The need for adequate legislation is the subject on which we're focusing our attention this year. We will have a number of legislative options, which will be discussed both formally and informally, and we hope that you will give careful attention to them.

A second major item I'd like to talk about is regionalization. We've talked about it for a long time, particularly in the form of regional disposal authorities, as a good thing both economically and environmentally in solid waste management. But the sad truth is that too few such authorities have emerged.

And, as in the case of Des Moines, for instance, those that have emerged certainly have not done so easily. We ought to have many examples of regional landfills and regional disposal authorities. But the fact of the matter is, we don't.

The Federal Government had to fund one here in the central region of the United States for the sole purpose of showing the people in the rest of the States in this area that we can reach our goals if we pay enough attention to it, if we put enough money into it, and if we get governmental authorities together. We had to fund that separately to show that it could be done. It's worth addressing here, the issue of what more can and should be done to foster regional approaches.

Thirdly, we'll be discussing with you the draft sanitary landfill guidelines. We're going to be very aggressive in soliciting your views on these draft guidelines, not only from a technical point of view but also from a cost-benefit point of view.

What, for example, would be the economic and environmental implications of requiring the use of daily cover for an isolated town of 500 persons in the middle of Nevada? Or for a community in the middle of the rainiest region in Oregon, or the driest region in Oregon? Between the western part of that State to the eastern part you will find totally different conditions. I understand we have some people here from Moscow, Idaho. Perhaps the small-community point of view should be very vigorously represented by them and others.

More important, what can be done to take into account such geographical and other considerations while still fulfilling the intent of the guidelines as a means of ensuring environmentally sound land disposal practices?

Finally, as Sandy Hale will discuss, we're just beginning to identify and talk about what we think are major issues in proposing legislation to take the place of the Resource Recovery Act of 1970.

Your views will be important. We solicit your critical comments not just on sanitary landfills but also on those problems and opportunities which you in the front line of solid waste operations around the country see as most important.

Charles B. Wheeler*

I have an unusual background for a politician, because I am a pathologist, that is, I run a medical laboratory and I also have a law degree. I took two degrees because I wanted to go into a field called forensic pathology and I actually started my political career about eight years ago by running for coroner. After being coroner a couple of years, I became a County Commissioner or, as we call them, a County Judge, and spent four years on the bench running Jackson County.

I got whipped once when I ran for Presiding Judge but was more successful in the race for Mayor. So I wind up as about the only politician in the United States who can stand up and publicly admit that he makes his living by taking blood from the public.

With a medical background, as you might well imagine, I have a great interest in the problems that pollution creates for the human body. I have been very vigorous in my efforts to improve our pollution programs, and I've gotten excellent cooperation from the Environmental Protection Agency. Together we collaborated on a bond issue last August that the voters approved by about 68 to 32 percent that provides the city with 8.3 million dollars for solid waste disposal.

I face all the problems of an elected official. We have only a limited number of ravines and most of them seem to be close to flowing streams and those that are available seem to be quite some distance from the urban center. We also have transportation problems because of the limited number of bridges across the rivers that we have in this area.

In addition, we have many jurisdictional problems because of State lines and county lines and many suburban communities. We are a regional thinking group here in Kansas City. We have a Mid-America Regional Council to which we are purposely assigning more and more responsibilities.

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*Mayor, Kansas City, Missouri.

They have done an outstanding job with their sanitary landfill, a far better job than the City of Kansas City was able to do with a similar project. So my thinking is regional thinking, and I do want to develop programs in water, air and solid wastes that can be managed by this particular agency.

I want to close by saying I'm particularly interested in recycling land after the solid waste is decomposed. I recognize this as an area that has not been studied long enough to have facts and figures, but it seems to me that we would all agree that burying solid wastes is the logical answer for most of our problems.

You can recycle about 30 percent of your solid waste before you bury it, but you've got to bury 70 percent of it. I would prefer to bury it approximately 10 years and then recycle it. Let nature do a lot of the decomposition. But I recognize the fact that certain substances are getting in very short supply and we have to go back and reclaim those for future generations. These are the things that really interest me.

I commend you all for coming to Kansas City for this conference and I hope a great deal of good comes out of it.

Samuel Hale*

I'd like to first of all reiterate something that Dave Dominick said. And that is, it seems to us that this kind of public-private forum should have been held long ago.

I hope not only that we can use this forum to talk about sanitary landfill, which is the subject we're going to address ourselves to in the panels, but that we can continue using such forums as a means of discussing a whole host of other issues which we think are equally important. We've already had discussions with NSWMA as well as within EPA to continue meetings of this sort in the future.

As most of you know, the Resource Recovery Act of 1970, the Act under which we're currently operating, expires June 30, 1973. We're just beginning to consider the options about where we're going to go in terms of making our own proposals, what Congress is likely to be thinking about, and so forth.

It seems to us this is the right time to present to you, at the State level, the local public level, and the local private level some of the major issues, as we see them: some of the problems, potential solutions, and other issues from the Federal Government's point of view. You can then be thinking about some of the same kinds of problems for one sole reason; that is, if we're going to really respond to the problems you see, it's very important that you begin considering them now and make your views known in the very near future. For the State people in particular, we're going to try to discuss some of these issues tonight.

We see essentially three problems facing "Solid Waste Management" today, and it will become clear later why I inserted the quotes.

First, obviously, are the health, environmental, and related impacts associated with every waste, but the ones I think have been ignored in the solid waste community by and large up to now are the adverse impacts of hazardous wastes. In using this term, I'm talking not just about solid waste but also about liquids and sludges as well. That is, it's time that we, the solid waste community, start looking at not only solid waste, and not just particularly municipal solid waste, but at all the things that are ultimately going to be disposed of on the land.

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*Deputy Assistant Administrator for Solid Waste Management Programs, U.S. Environmental Protection Agency.

I think it is particulary important as we begin tightening up on air and water pollution controls, as we begin taking actions on disposal sites that are going to create disposal problems, as we begin shutting off the ocean as a possible disposal alternative, to understand that more and more pressure is going to be put on the land.

The land is the one repository that at this point is just not adequately regulated. We've got to consider what to do to protect the land in the same way that we're protecting the air and the water, including the oceans.

Let me make two additional points about this problem. Unlike the problem of, say, auto emissions, and with the possible exception of certain hazardous wastes, we're talking largely about using today's knowledge and technology to solve a problem we know how to solve.

The point is, we know how to solve the problem now but in most areas we simply aren't doing it. There are many reasons why that's so: political reasons, institutional reasons, managerial reasons. I believe the primary reason is simply that, in the absence of adequate regulations, adequate standards, adequate enforcement of these standards, there's a very strong incentive to use the land adversely. Something must be done, just as in the cases of air and water, to take steps to assure that we are going to protect the land.

Next, I would reiterate the point I made earlier that we're no longer limiting ourselves to the separate municipal solid waste problem that we've been talking about for years. Rather, we're concerned with a problem that goes well beyond that to include all wastes that ignored in the solid waste community by and large up to now are the adverse impacts of hazardous wastes. In using this term, I'm talking not just about solid waste but also about liquids and sludges as well. That is, it's time that we, the solid waste community, start looking at not only solid waste, and not just particularly municipal solid waste, but at all the things that are ultimately going to be disposed of on the land.

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Next, I would reiterate the point I made earlier that we're no longer limiting ourselves to the separate municipal solid waste problem that we've been talking about for years. Rather, we're concerned with a problem that goes well beyond that to include all wastes that are going to be disposed of on the land, whether they are solids, liquids, or sludges. The thinking over the next two days must reflect this broader approach to the problem. We must start talking more about hazardous wastes, more about non-solid wastes, more about non-municipal wastes.

The second problem that we see, and one that's not so obvious, but is particularly critical at the local level, is that of low productivity of solid waste management systems. We have studied many systems of public agencies and private institutions around the country, and the conclusion we draw is this: most of those agencies and institutions are far less efficient than they ought to be. For a host of reasons most cities, whether they have public or private service, are paying much more for solid waste collection and, to a lesser extent, disposal than they need to be paying for a given level of service.

Let me cite a couple of instances. We've been able to go into certain cities--Cleveland for example--that have been willing to take steps to try to build a more efficient collection system; and with very simple techniques, we've been able to save them 20, 30, 40 percent or more of their collection costs.

Many cities that have converted to private collection have experienced similar savings. A lot of them have been able to make these improvements on their own. But the number of cities with efficient systems is still a very small part of the total. We feel very strongly, after examining many cities across the Nation, that most of them are paying too much for solid waste management.

This fact really has two impacts. One is that it makes it much tougher to engage in any kind of environmental upgrading. Taxpayers simply are unwilling to pay more for solid waste management when they see a lot of inefficiency in the system now. It really hurts when it comes time to say you're going to have a sanitary landfill rather than an open dump. The other impact is that taxpayers and consumers alike are simply paying too much for solid waste management when there are some very simple steps that could be taken to substantially reduce costs. So we would cite low productivity as a second kind of "solid waste management" problem.

The third problem is really two problems. It's much, much more difficult to put concisely into words, but basically it is the problem of the decline in resource recovery and resource conservation.

We've conducted a number of studies on the benefits of resource recovery and we can cite a number of benefits of either resource recovery or resource conservation. Two benefits, for instance, are the avoidance of the cost of any adverse health and environmental impacts associated with waste disposal, and reduced environmental impact in the production of goods. For virtually every material category we've looked at we find that using secondary materials rather than primary materials generates less air and water pollution, generates less mining and processing wastes, uses less resources, such as energy, and fresh water. It also requires less dependence on foreign raw materials.

If you catalog all these benefits you come out with a fairly substantial list. Yet the fact is that over the past two decades, in fact since World War II, resource recovery for virtually every major category has been declining relative to the GNP, relative to production and so forth. In other words, secondary materials are becoming less attractive to a producer. At the same time, from society's point of view, they are becoming much more attractive.

The second aspect of the problem we would cite is basically this: waste loads are growing at a much faster rate than the GNP and population are increasing, and at the same time those waste loads are becoming increasingly difficult to dispose of, because of the addition of such materials as PVC or PBC and so forth. Also, waste loads are increasing at a very rapid rate because of changing consumer habits such as demands for increased packaging, and those greater quantities of wastes are becoming more difficult to dispose of. Finally, less and less of those wastes are being recovered.

These, I think, are the three major problems as we see them in solid waste management, broadly conceived. We realize this goes substantially beyond what's been the traditional role of solid waste management. We think these are the kinds of issues we have to begin to address as we determine Federal policy, as the States determine State policy, in fact, as the localities determine their policies.

What I'd like to do in the next couple of minutes is basically this: one, relate current Federal solid waste programs to those problems I've just described and, two, spell out a couple of the issues that relate directly to you at the State and local level.

First of all, let's look at how the OSWMP, that is, the Federal solid waste program, stacks up against the problems I just mentioned. Frankly, it doesn't stack up very well. I think all of us recognize there have been substantial gains since we passed the first Solid Waste Disposal Act in 1965. Most States had no programs in 1965; now we see over 400 people at the State level in solid wastes, and local level competence has come up substantially. There are a lot of examples of what can be done in solid wastes now that couldn't be done in 1965. Despite this progress, however, we believe that in the aggregate, most solid waste management systems still rate very low in terms of both environment and economics. We're paying too much on the one hand, and we're not doing a good environmental job on the other. As evidenced by our Mission 5000 survey this summer, in some areas we're even worse off, in terms of dumps, than we were in 1968. In other areas we're doing better, but not nearly as well as we ought to be doing.

Our studies of productivity show we're paying much too much in most areas for solid waste services versus what we ought to be paying for that level of service regardless of environmental adequacy.

The Federal Government's program as currently conceived is not well suited to deal with any of those problems. Let me elaborate.

First, in the absence of a standards enforcement program, we have essentially followed what we might call a "carrot only" approach in trying to get upgrading of land disposal sites. That is, we've used publicity through projects like Mission 5000. We've used our planning grants and demonstration grants trying to essentially create a positive incentive to get communities to upgrade their disposal systems.

But the kind of torturously slow progress in meeting our Mission 5000 goal is a good indication of the fact we're simply not getting there this way. I'm not going to pin any blame for that, but it's something we're very concerned about. It's not necessarily a legislative issue but it's an issue which causes us very deep concern. Why are we progressing so slowly in simply upgrading our land disposal practices?

Second, the program that has been most successful in terms of productivity is a technical assistance program of going into those cities that really want to do something and enabling them to do something. Yet, despite the fact that we have some very clear examples of what can be done for cities, like Cleveland or Huntington Woods, for example, most cities for a variety of political, institutional, management, and other reasons simply have very little incentive to try to upgrade the productivity of their systems. Again, there's very little we can do about this particular problem.

Third, in the face of what we can see clearly as a problem--insufficient demand in resource recovery (that is, a market problem rather than a technology or supply problem)--there's very little that the Federal Government can do to attack that problem. We do have a demonstration program where we can try to show what technology can do. Some of that technology may, in fact, lead to cost reductions. In some cases it may lead to increased demand. But I think we would say that that is not going to create a substantial market incentive and, therefore, we're not really doing very much on the demand side to try to turn the resource recovery situation around.

Finally, and perhaps most discouraging, EPA has not promised to do anything about the hazardous waste problem, that is, the increasing disposal of hazardous wastes on the land. And equally discouraging, most States are not in a position currently to do anything about the problem. It's true that Oregon and California are really launching some pioneering efforts to try to lead the way in this area. The rest of the States, to our knowledge, are just beginning to even notice, as we are, that there is a substantial problem.

A year ago when I came into the program we viewed Section 212 of the Resource Recovery Act, the hazardous waste section, as essentially an add-on to the bill and none of us took it very seriously. But today as we see the effects of hazardous wastes on air and water pollution control, as we begin to document some of the problems with what's going on the land, we see that this may in fact be the most critical landfill problem.

In short, then, I think that the Federal program has some serious gaps in terms of what the problems are versus what we're able to do about those problems. Now that doesn't mean the Federal Government ought to be doing anything about any of those problems, but I think it does raise some issues at our level, and at the State level, which you and we have to be facing over the next few months as we begin to think about what kind of legislation is going to replace the Resource Recovery Act.

Let me mention a couple of other issues which I think bear directly on you (and there are many more issues that I'm not going to go into).

Certainly most important from our point of view, is the question of regulation enforcement. I think we would basically say the following: As we begin to tighten up on air and water pollution control, on pesticides, ocean dumping, and so forth, we begin to leave a big gap in the regulatory area, that is in the whole area of land disposal.

We're creating by our various actions, by the EPA's and the States' various actions, a very substantial incentive to misuse the land as a disposal mechanism. And we have to begin to think what kind of a regulatory program, if any, is warranted to take care of that problem.

I think we would also say that our "carrot only" approach is not going to get the job done. We look at what's happened in Mission 5000, we look at the results of our summer survey, we say it's time to decide what's got to be done, if anything. And we do have very clear evidence that the "carrot only" approach is not going to work.

Let me just bring up a few questions we have about regulation. Which elements of the solid waste system, if any, should be regulated: generation, storage, collection, processing, recovery, disposal? Which industry should be regulated: industrial, municipal, agriculture? Are we talking about solid wastes only, or solids, liquids, and sludges? If some regulation is justified, who should do the regulating--Federal, State, local jurisdictions, or combinations thereof?

If States have the primary responsibility, is there any Federal role in terms of preemption, or should there not be a Federal role? What types of standards should be established: process, operating, performance, emission, or others?

One question we're very much concerned about is the whole issue of State non-importation laws. We're extremely concerned about States, particularly in the east, that seem to be rushing to either pass, or get legislation consideration for, non-importation laws. And we have some serious questions about this particular aspect.

I want to make a couple of related points about these regulatory questions I just raised. (These are my own personal opinions, I should stress.) I think a very strong health and environmental case can be made for the need to regulate hazardous wastes particularly at some level. I'm not saying which one.

Second, I think there's a clear precedent in the environmental area for State, not Federal, regulation if the States are going to do it. If you look at the air and water areas I think you will see the precedent is quite clear, and I would expect that any congressional action in this area would look to that kind of precedent.

Third, in the hazardous waste area, the whole question of regulation is very closely aligned with the question that was asked us by the Congress in 1970; namely, what should we do about setting up a national system of hazardous waste disposal sites. That's an issue we're basically looking at separately.

Another question that concerns us greatly is that we think any environmental regulation at any level ought to apply equally to public and private bodies. In some States that simply isn't being done now. There's a lot more political pressure not to move against a city if the city itself operates dumps, but to us this is simply an unacceptable situation. Any regulation ought to apply equally to everybody in the field.

Besides environmental regulation, a question we're not going to discuss here but which is of interest in terms of the public-private interplay, is what should the public agencies who contract with the private bodies do about the whole question of economic regulation of those private bodies?

While this question is unlikely to be a legislative issue per se--there's no precedent for Federal action in this area--we feel obligated to take a stand on it. I think the States in particular should begin to examine this in some detail.

It's my belief that any regulatory program at any level--State, local, or Federal--should have some kind of provision for citizen suits. The reason for this is simple: A program is much easier to regulate, in my opinion, if you have the additional uncertainty of not knowing whether a citizen can come in and sue for inadequate disposal practices. It creates an added incentive to get a poor operation to upgrade its operation.

The second issue we're looking at that fully derives from the first is the whole question of assistance to State programs. If we look at what I've just said about problems, I think we would say that from our perspective the highest priority State activities ought to be: (1) a standards and enforcement program and (2) technical assistance related to that program and to the whole problem of low productivity systems.

Let's now match that with what the Federal Government funds at the State level, and that is basically planning. We have a very strange situation at the present time where we see high priorities in one area and yet by being able to fund only other areas, namely planning, we may lead States away from what we have identified as the highest priority activities.

So I think this is another question that has to be asked: namely, what are the high priority State activities? Does the Federal Government have a role in funding those State activities? If so, there's a whole host of subsidiary questions that have to be asked, obviously: What kind of flexibility should the States have? Is there really a Federal role? These are questions I think we're going to try to address over the next month or two.

Finally, and perhaps the trickiest question from our point of view, is the issue of financial assistance to local governmental jurisdictions. Clearly the thrust of what I have just said--that is, calling for much stricter regulation at some level of hazardous waste disposal as opposed to non-hazardous waste disposal--is going to cause cities to have to pay more than they are currently paying for at least hazardous waste disposal. Now many cities, we feel, can offset part, or in some unique cases even all, of those costs by increased efficiency on the collection side. But the fact is, most cities would simply have to pay more for adequate disposal than they're now currently paying.

That gives rise to a whole new series of questions: What is the existing financial situation in solid waste management at the local and regional levels? What's the likely impact of environmental standards going to be on that situation? Is there a need for some kind of a strategy or strategies embodied in Federal or State financial aasistance to those localities? And is that really a proper role of either the States or the Federal Government?

Let me be brief and fairly blunt about how we see the existing situation. The fact that most cities at the present time exhibit very poor levels of performance leads us to believe there's a lot of slack in the current financial base of most localities. The fact that some cities are doing it well leads us to believe it's something that localities can finance on their own. However, we would say that most cities are not going to do that by using their traditional means of financing solid waste management systems.

For a public agency that is depending particularly upon general obligation bonds and general revenue, we would say that there is a whole host of other financing mechanisms: user charges, non-general obligation bonds, bank financing, in a lot of cases leasing, calling on private industry with its capital financing resources, and so forth.

And of course, there are other alternatives which not only provide substantially more financial capacity at a time when taxpayers have clearly shown they are unwilling to pay higher general tax bills but also, from our perspective, seem to be more efficient kinds of financing mechanisms than general revenue and general obligation bonds. Besides, the fact is you can get more money through these other financing vehicles. We also think that they create a substantially stronger incentive to be efficient.

In fact, we would go on to say one additional thing. We think the single most important determinate of efficiency is the existence of user charges. We think the user charges themselves create: (1) a very effective financing vehicle and (2) a very, very strong incentive to upgrade the productivity of an operation.

We realize there are problems with user charges, particularly the question that's always asked of us, namely, what will be the impact on the poor. But I would say, first of all, you're going to have that problem with any kind of financing vehicle. It's much easier to take into account how you're going to subsidize the poor, if that's a local decision, through the user charge system than through any of the other financing mechanisms. We would cite the fact that some cities are facing the problem satisfactorily now with the user charge system.

All of this leads us to say that from our perspective, we don't see a substantial Federal role in terms of financing local jurisdictions no matter what the outcome of the other kinds of questions that I address as being either appropriate or particularly necessary, in the sense that we think a number of cities are doing it now.

We see very little reason to penalize Los Angeles, for instance, that has an adequate disposal system, now self financed, to pay, for instance, for New York City which doesn't have adequate disposal mechanisms and would like Federal assistance. Why transfer those kinds of funds? We just don't feel it's appropriate.

Any of the kinds of traditional Federal financing vehicles, particularly grant programs, are going to exacerbate the kinds of problems of productivity I talked about earlier. I realize this is not going to be a very popular stance for many of you in this room, but we feel it's a very, very necessary stance and one we're willing to elaborate on at any length.

There are numerous other basic issues that I could have addressed and didn't--the issue of resource recovery, resource reduction, and others, but I have tried to highlight three of the issues that most impinge on you in this room. The question of regulation, the question of where we're going to go with our State assistance programs, if anywhere, and the question of financial assistance to local jurisdictions.

I would hope later on in this program we could elaborate on many of these issues and more importantly I would counsel all of you, because you have strong self-interest, to go back and think about these issues yourselves, try to formulate institutional kinds of positions, and let us know what those positions are. We're very, very interested.

We're at a point in time where we can still change our minds and we're all just beginning to formulate our opinions. In knowing your opinions, we are willing to be influenced. We are not going to be able to be influenced after July; now we are. I think that time is very important, and I would very much solicit your views on this and any other subject regarding the legislation.

PANEL A

SELECTING SANITARY LANDFILL SITES

MODERATOR: John Talty*

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*At time of conference, Director, Processing and Disposal Division, Office of Solid Waste Management Programs, U.S. Environmental Protection Agency

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HOW TO SELECT AND ACQUIRE A SANITARY LANDFILL SITE

Peter Vardy

To start off, I'd like to make one thing perfectly clear, and that should make me popular with the Administration today. There is practically no site that I can think of that cannot be developed with proper design and proper implementation techniques that would adequately protect the environment. The question is, what are the gives and takes, what are the trade-offs in doing this?

I'm a little concerned at times with becoming too hung up on regulatory problems. We're not concerned enough about developing good practices. If good practices are developed through information, through the very kind of program we're having here today, I think the burden on regulation will be considerably reduced.

As Mr. Dominick mentioned earlier, solid waste in particular does not lend itself to political boundary solutions. I fail to see in most cases the logic of relating solid waste management programs to political boundaries. Perhaps on a State level they do make a lot of sense, but not on a county or municipal level.

I think the sooner we learn the concept that regionalization is the best solution to the disposal of solid wastes, the sooner we will be able to implement some very effective economical and socially acceptable programs.

The problem of solid wastes management in general and solid waste disposal in particular has reached critical proportions during the past decade.

Disposal problems are generally related to four basic areas of concern: Technical and environmental problems, economic concepts, social attitudes, and jurisdictional conflicts.

The urban sprawl that has developed since World War II has created a serious refuse disposal problem both in terms of development of what one expert calls "a scheme of operation" or a system of refuse handling and processing prior to ultimate disposal. This increased urbanization and the extensive development of rural areas have intensified the health and nuisance problems associated with open dumping and burning. At the same time there has been a rapid decline in the availability of suitable disposal sites.

The economics of collection, transfer, processing and hauling to the disposal site have become so complex that computer analyses of optimum systems are frequently required.

To add to the problem, past and current mismanagement of solid waste disposal facilities has alienated the public, as evidenced by the strong objectives raised by opponents of sanitary landfills at just about every public hearing involving the establishment of a new disposal site.

To successfully implement effective solid wastes management programs, it is essential that public administrators, planners, public works and health officials, as well as engineers, economics, media representatives, and other elements of the private sector be informed of both the problems of waste management and available solutions.

The purpose of this meeting is to focus on one important aspect of the waste management problem: namely, to present an overview of efficient planning and implementation of sanitary landfill programs specifically designed to serve urban, suburban, and rural areas.

In discussing the various factors which must be considered in the selection of a sanitary landfill site, I have assumed that some previous larger-scale planning has been completed which essentially dictates the need for the sanitary landfill method of disposal together with certain other volume reduction techniques such as incineration, pyrolysis, composting, and chemical and biological processing. Obviously, the need for disposal of certain wastes tc land remains no matter which supplementary processes are utilized. However, such decisions must be made prior to the actual site selection process.

The art, or "the science", if you will, of sanitary landfill site selection has come a long way during the past few years. Where in the past site selection was guided primarily by such factors as remoteness from developed areas, availability of land, distance of land, and accessibility by collection and transfer vehicles, many new criteria have been added to the basic selection process since then.

The order of priority in which the various parameters that I will present to you this morning are considered and analyzed depends on the solid waste management problems characteristics of each and every local, regional, countywide or Statewide service area under consideration.

I have attempted to present to you this morning some kind of a simplified flow chart that will show what process you have to go through to select a sanitary landfill site. I've played with this idea for days and weeks and I've been unable to do so simply because for each given area, geographic area as well as political, the priorities that have to be considered in the selection of a landfill site are different.

This does not mean, however, that you only consider those parameters of site selection that you think apply to that one area. You have to go through the process of evaluating all the parameters, and those I will attempt to give you this morning. There may be some I have omitted. There may be some that need more emphasis than others.

The main point is that there is more to site selection than drawing circles, running computer programs on distances of land and finding the ideal location in the center of that circle and then matching that or tying it into the other problems which exist, namely, is the site geologically acceptable, is it hydrogeologically acceptable, or is there a minimum of public protest or opposition to that particular site.

The major factors to consider in the selection of a sanitary landfill site basically fall into three areas: (1) technical/environmental; (2) economic; and (3) socio-political.

The fact they're numbered does not mean that one is more important than the other for a given area. Number 3 may be the overwhelming factor for some, but for others the economic considerations are of primary importance. The important thing is that you properly evaluate all three and come to a decision of where you give and where you take.

I will try and break down the technical/environmental considerations into three basic areas: the waste material, the site, and the environment with respect to the waste.

Remember please that we're talking about only site selection, not about an overall waste management program. We're concerned with the source of the material, where it's generated geographically. Is it from residential, from commercial, from industrial sources, what type of material is it? We're concerned with whether you're dealing with any toxic or hazardous wastes, ordinary municipal wastes, agricultural wastes, demolition materials, and so on.

And what kind of a handling system is available to us today or what kind of a new system are we going to move into as a result of some larger-scale plan such as a State waste management plan or regional plan that has been developed into which we're trying to tie the selection of the site.

So we are concerned with the source of the material, with the quantities of waste generation, and hopefully we're going to be dealing with quantities of weights and not volumes. Volume becomes a very confusing thing to work with.

We're concerned about the characteristics of the material, what kind of a site is needed for a particular type of waste, whether it's the normal municipal waste or it's sludges, whether it's liquid waste, toxic, hazardous materials, pesticide containers and so on.

What are some of the critical waste handling data we have to have which come into play in the site selection process? What kind of collection and transportation systems are available? Are there any transfer stations? Are they existing or proposed? Is there any processing of the waste being accomplished, such as milling, baling, resource recovery?

These are all important with respect to the selection of the particular site. For example, if milling or baling is used, you may comtemplate using less cover material or perhaps no cover material, if we can convince some people about this. This would have some influence on whether a particular site that has less cover material available is less feasible or can be considered or not.

And of course we come to the normal approach, the distances of so-called service areas to which the site must be sufficiently close to make it economically feasible to service those areas for disposal purposes.

Then we get to the site itself. In fact, usually we're talking about a series of candidate sites, which are established in two ways.

One, existing sites that may need upgrading. You certainly want to look at existing sites first, if for no other reason than that the problem of public acceptance usually is far less serious on existing sites than on new proposed sites. Secondly, you look at proposed sites and how you arrive at those sites may be based on all of the criteria that I'm presenting to you this morning.

If you're talking about toxic and hazardous materials, of course, then the geology or the natural setting of the site becomes the primary concern. If you're talking about municipal wastes, then economics or the socio-political aspects may be more important.

At any rate, you nail it down to a number of candidate sites and then you progress from there in applying these various parameters to the sites.

In the evaluation of a specific site, we're looking at such questions as capacity, its physical characteristics, its location, and the land use requirements which we may want to tie into with that particular site.

The next things to consider, of course, are such questions as topography, accessibility, and climate. Do you have high, average, or low rainfall? Is it an arid or humid climate? What are the geologic features of the site? This is particularly important.

Probably one of the key questions that determines the economics of developing the site for a sanitary landfill is whether sufficiently impervious soils are available below and around the site. If they are, this is a great plus. If you are directly on top of rock it's a problem because of the fractures and the jointing in the rock. They have a tendency to transmit leachate and gases away from the site. What is the drainage of the area? Is the development of the site going to improve or create problems as far as drainage is concerned?

Other factors must also be considered. What are the hydrogeologic features, what is the ground-water table, what is the historic high of the ground-water table as achieved in the past in that particular area? Is cover material available or are there other sources of material available for site improvement as far as construction of levees, access roads, and various other improvements that are required for the development of the sites?

Incidentally, with respect to cover material, I'm quite often perturbed at the tendency to specify what cover material is good cover material, leaving you with the impression that if you don't have, for example, sandy loam available that it's just not a very good site. As it turns out, you use what you have. And usually what you have will do the job, provided you use it properly. You can have fat and expansive clays which tend to crack, but you can properly protect it depending on what the end uses of it are for that site.

You can be terribly lucky and have sandy loam or a clay silty sand, if you will. I'm not so sure whether that's always the ideal situation, but in certain places, it does the job very well. In other places you can have just clean sand and that, too, may be acceptable depending on what the ultimate uses for the site are.

What are the natural resources you may be dealing with? Are you dealing with a sand and gravel pit which may be still active, with a strip mine? The question of utilizing areas of natural resources recovery are very important to consider in the selection of a site.

What are the long-term use needs? What is the land to be developed for: open space, recreational, agricultural, flood control purposes, or for residential, commercial, or industrial development? These all have a very serious bearing on the selection of a site.

And then, of course, you want to look at existing sites and see what it will take to first evaluate the site, whether it's performing adequately, and what it will take to upgrade it to meet proper sanitary landfill requirements.

The environment, of course, is something that we're getting into more and more, and chances are that from now on there's going to have to be an environmental impact study prepared for each particular site. There are several criteria that have been developed for that purpose. You could use the EPA guidelines, which I think are excellent, with respect to sanitary landfill environmental impact studies.

There are other guidelines, the USGS guidelines, but at any rate, you will consider the physical and chemical aspects and the ecological, aesthetic, and health and safety factors.

With regard to economic considerations, of course, there are many variables: The distance and method of haul, cost and method of land acquisition (purchase, eminent domain, or leasing), cost of site preparation, landfill operations in terms of manpower, and equipment and installation of environmental control systems. The last is something we have to think about now on every site. It may not be necessary on every site but we may have to install it and we have to evaluate the cost of it. Also involved are the cost of actual long-term monitoring and reading of the surveillance data, cost of final improvements to meet the end-use requirements, and cost of post-landfilling maintenance. This is something most people tend to forget, but it's an extremely important thing and you have to budget a considerable amount of money for this post-construction period.

Then you have the question of trade-offs. What are the total capital and operating costs versus the end use benefits? It it worth spending more money on engineering for site development in order to get the benefits that will accrue in the end as the result of developing land, for example, in a highly organized area, which will serve as very useful purpose?

Financing alternatives, of course, are many. Sandy Hale alluded to many of these both in the area of planning, capital improvements, and operating costs. There are things available such as EPA planning grants, hopefully the HUD 701 program, the 704 program, and the Open Space Land Program, and the Bureau of Outdoor Recreation program.

The Mountain View Shoreline Regional Park, which was developed south of San Francisco, receives the refuse from the City of San Francisco and is a 550-acre site reclaimed from marshlands near San Francisco Bay.

The way it was financed is a rather interesting procedure. The cost of development of the land acquisition was 2.4 million dollars, and this was financed by a combination of State, Federal, and local sources.

The Bureau of Outdoor Recreation, through the State of California Department of Parks and Recreation, made available 1.2 million dollars to the City of Mountain View. In addition, $600,000 was obtained from the Santa Clara County Department of Parks and Recreation, and the City provided $600,000 from the Parks and Recreation Bond Fund supplemented with sales tax revenues. The City then formed a special district which encompasses this park; it is made up of the same Board members as the City Council.

Through special state legislation they were able to issue new bonds and become a taxing authority, in effect, to finance park improvements. One of the first acts of this new district was to sell revenue bonds to pay back the sales tax bonds advanced by the City.

Disposal fees will pay most of the costs of filling the park to designed grades, and the present plans are to finance park improvements such as the golf course, structures, restaurants, sail boat lake, and so forth, by future revenue bond issues paid for by concession lease fees to the site.

As you can see, many of these systems can be incorporated into one particular site.

Socio-political factors all require careful consideration: existing legislation and laws, existing plans, how they tie together, what the political climate is, what kind of public relations and information programs are necessary to achieve acceptance, what are the land use and zoning controls, and finally what are the community interests and individual interests in the area. These are things which certainly bear consideration and analysis.

EFFECTS OF INDUSTRIAL AND HAZARDOUS WASTES ON SITE LOCATION

Donald Andres*

When we talk about hazardous wastes, there is a solids category consisting of off-grade, out-dated products or items that have been contaminated. We have thrown away a couple of truck beds, for instance, where a load broke. That happens to be a solid waste that a liquid got into. We have a lot of spent liquids, caustics, acids, and solvents that are discarded. We have slurries. Many of these contain heavy metals or organic chemicals that are toxic. And we have what we call sludges which could be the bottom out of ponds, tank bottoms, and this pond bottom may be more important with some of the environmental legislation that's taken place.

There is no one solution with regard to locating a site for disposal, because it depends on the type of waste you're handling and it depends on how you're going to handle it.

The geological conditions are very important. You need a very detailed geologic investigation. Obviously you can have no seepage to ground water or surface waters but you have to also be concerned about seepages to adjacent properties. Someone working in an excavation adjoining a disposal site might run into something he is ill prepared to cope with.

You also need to have more stability of slopes and embankments. A sudden failure of a pond, a dike, or a landslide in general would be a lot more catastrophic than some of our more routine wastes. The native soils might have to be modified through chemical liners or addition of more fine or expansive soils.

Drainage control is very important. Our water supply people have cautioned us that if you have these kinds of things and you have a public water supply you need cross-connection controls.

Many of you have heard about the classification system that our State Water Quality Control Board uses. Wastes are classified in Groups

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1, 2, and 3. Three is inert, generally non-decomposable material, such as clay, concrete, etc.

Class 1 comprises the very hazardous materials. But what's hazardous to water quality may not be hazardous to you and me. And this is where the classification system from the Water Board falls a little short. That's why we have entered the field with other guidelines.

For instance, in the southwestern part of the United States we're very concerned with ground waters and the increasing mineralization of these water sources. So a Class 1 waste is water-softening brine and you and I swim in it. It's called the Pacific Ocean. It doesn't hurt us but we don't like to drink that stuff. So in a strict water quality classification that does not cover everything.

Class 2 is everything that falls in the middle.

Then we turn around and classify disposal cites. A Class 3 disposal site provides little or no protection to water quality. You're dumping in the water. If you can dump in ground water, in surface water, you'd be worried about floatables or sedimentation and this would have to be controlled.

A Class 1 site overlies areas where there is no ground water or isolated body of unusable ground water. In California we have only 11 Class 1 sites. Many of them overlie marine sediments. I'm not sure what the people in the Midwest are going to do. You cannot adopt this verbatim, but this technique of looking at the geology, and we look at it mainly from a water quality point of view, governs most of our site selection.

Air quality regulations also influence our methods. Up to a little while ago, we used to dispose of a lot of things through evaporation, but now somewhere between a third and half of our State has restrictions on the amount of solvents that can be disposed of through evaporation, a gallon and a half per person per day. You'd have to paint your house very slowly in order not to violate air pollution regulations.

I'm very concerned about the trends of the future. As a person who makes his living in solid wastes, I'm very pleased to see them, because our problems are going to get bigger as time goes on.

We're seeing tighter and tighter controls in those areas where people are concerned with water and air quality. I was very pleased to hear Sandy speak in favor of land control, but I was kind of distressed to hear EPA being proud of its ocean disposal policy. Maybe Mr. Dominick is a member of the Pisces group. I happen to be terrestrial and prefer to keep my habitat, the land, safe enough for me to walk on and drink the water underneath it. And I would prefer to get a few more of these minerals back out there and let the creatures that live in the briny deep keep them.

We have not had enough concern about land use. Concerning the air regulations, we first attacked incinerators and we got rid of the bad practice of burning solvents. Because the material left in the solvents left black fumes coming up, we refined them down and we still have this gunk left. And to burn it we've got to take all the gunk out and if we could do it, you could reclaim the solvent.

You get down to the point of diminishing returns. This is terrible stuff to handle. You don't want this mixed with refuse. Unless you want a big volume reduction in your site through a fire, you just don't put it around refuse.

But now we can no longer evaporate it. We've got paint manufacturers who seem to be putting more in drums to store, looking for a place to go with it, than they are shipping out their front door as a product right now. Maybe we'll import our paints from another State.

The other thing that concerns me is the new water policy of allowing little or no discharges to the surface streams. This means we put the stuff on land. If you're overlying some of our ground water basins where the mineralization is increasing, you're not going to be allowed to percolate this into the ground water.

So you may evaporate it and when you get all done, you've got all the salts and brine left in the bottom of the pond. We're doing this more and more as we're withdrawing stuff out of the sewers. Particularly since the Federal law now requires that industry pay its fair share of the sewage treatment process.

They're yanking stuff out of the sewers and evaporating it or taking it back to land. This stuff is not particularly toxic. It may be if it has some heavy metals in it, for instance, but there will be an increasingly large amount of materials that cannot be put on the ground just anywhere, and they will be hazardous to people and water quality and to the broader environmental aspects.

I have no detailed answers for you today, but I see this problem growing, and there may have to be a little bit more pre-treatment at industrial sites. This is fine if you've in a major complex. Maybe there'll be some caution. But if you have a hazardous waste disposal site, you better have something better than social security.

QUESTION AND ANSWER SESSION

Samuel Johnson: We have some hazardous wastes sites in Kentucky including an atomic waste site. We're running into a problem on sites that are not permitted to take hazardous wastes but are allowed to take some, and it's really throwing the devil into our budget. We found that yearly monitoring a site you allow hazardous wastes to go in, even in small quantities, is running around $500 to $1,000 a site just in lab costs.

So if you're going to allow hazardous wastes to go into a site and you also have this allowance in your law, where any person can bring a site into court, they'll go out there and pick up these pesticide cans and all this other stuff and you've got to go to court and prove that it's not causing damage to the ground water or to the surface water.

And it's costly to prove it. The last one we had just a week ago for one site was $500 for one shot, just on the lab costs alone. So you're getting into a field where we're going to need a lot of money and help to go into it.

Bryan Miller: I have a question for Mr. Andres. On your classification of hazardous wastes you included hospital wastes. Can you tell me why they are so classified and what organisms you find in them that aren't found in normal residential waste?

Donald Andres: We found more in the way of "people" organisms. I happen to be a civil engineer and you're going way over my head. Some of our medical people can give you a list of names that I can't read. They talk about the contagious elements that may be there.

Basically, what we're concerned with is we're asking each hospital and infectious committee to determine what portion of the hospital has isolation wards, any area where the doctors must go in and gown up and mask in and out for what they consider a communicable problem, then we're concerned. Once such wastes are buried in a landfill, we lose a great deal of our interest.

But we find situations where the wastes are left exposed. We have had some situations where children have gotten in less than sanitary landfill site operations and have brought the material out. Its the handling aspects more in medical waste.

If you'll permit me, I have outlined some of the definitions we're using in hazardous wastes. They are toxic or poisonous, corrosive irritants, strong sensitizers, flammable, explosive, or infectious. And then we go on to define those further in specific State codes. The bulk of the hospital wastes is not hazardous.

Bryan Miller: The point is, its in the normal population, in the doctor's office or in the household. Why should it be considered hazardous simply because it came from a hospital?

Donald Andres: We're also talking about medical offices, in some cases. The hazard may not be totally infectious, however, this is mainly what we're concerned with.

It's the concentration in one area. And when a dozer goes into a pile of that stuff, the aerosol coming off of it may be a concern and it may be a concern in the loading of the stuff into the truck from the medical facility.

D. D. Freeman: Mr. Vardy spole on the subject of certain types of landfill cover being acceptable only for certain site preparations, sandy loam, clay, et cetera. What categories would these fit into? Sandy loam, for instance, for parks and building sites? Can you elaborate on that?

Peter Vardy: You see, the question of what type of covering depends on what you're trying to accomplish with a cover. Now, if your main purpose is to protect the sanitary landfill from infiltration of surface waters, then of course you should confine yourself to the more impervious type materials. The more impervious these materials become, the more tendency there is for them to crack as they dry. In other words, the clay content will be higher.

Now they say they want to discourage that because then the gases escape and create a problem, or you're creating cracks where more water can go in.

So it depends on what you're really trying to accomplish with a cover. If, for example, you want to develop a golf course and the material that's available to you for general cover is a clay material, which may have a tendency to crack, we overcome that by a certain type of finishing of the site.

In other words, you can put on the top soil material which would be required anyway for planting purposes. You may have a sand blanket over the clay and the general irrigation procedure would keep the clay cover from drying up.

There's a feeling, for example, if you go to the more pervious covers that this would tend to dissipate the gases that are generated and the gas pressures won't build up underneath the cover. Well, you can overcome that by venting systems. You don't have to have the gas coming through the cover.

The point is, for any given type of cover material, you have to give some thought to what you're trying to have it accomplish. You design accordingly, based on the uses for the site.

It is very, very difficult to say this kind of cover material will do the job and another one won't. This is a flexible thing and all you can do is to determine what is available how you should design the site to accommodate that particular material.

Larry Kramer: I was wondering about the special handling problems with these hazardous materials. Is there any special procedure to segregate these hazardous materials at the disposal site?

Donald Andres: You don't want to do very much at the disposal site. It's already too late.

We now have in our State a licensing procedure for the hauling of liquid wastes. Because of the problems that have developed in that area, we have in our legislature at this time a bill which would require greater invoicing or manifesting on any material that is deemed hazardous.

The State would make such a list. We already have listed well over a thousand materials. The Occupational Safety and Health Association has a list of 11,000.

We're wondering if we should scrap this legislation at the last minute and go the way the United Kingdom has done, that is, listing what's safe. If it is not on the safe list, you must have a permit to dispose of it. It's identified by the source of the material or the producer of the waste identifies it.

To simplify paper work, on any sort of routine reoccurring wastes, the United Kingdom issues permits a year at a time for its disposal, so one doesn't have to be on the phone every day calling a regulatory agency to dispose of it.

John Talty: Don, are your Class 1 sites pretty well distributed in the state, that is, geographically?

Donald Andres: No, not at all. This is one of our major problems. Fortunately the sites are in our most industrialized areas, but we've had considerable problems in our rural areas with such things as pesticides and where to go with them.

Some of our haul distances approach two or three hundred miles to a legal disposal site. And I see very little of this stuff being hauled down the highways. But I don't go asking too many questions, either, because I have no solution.

Mr. William McNulty: What I've done, that might simplify it for some of you, I demand that the generator of the waste give me the chemical analysis. Until a year ago, when the Department of Health split up into the EPA and the Department of Health, I used to call the Department of Health and tell them what had been submitted to me and asked them whether or not I should handle it. I put all the responsibility on the generator of the waste. If they sent me a lye or something, it would seem to me that they would have trouble.

Donald Andres: Addressing myself to that and a previous question, about the only segregation or testing that's done on site generally is using an explosive meter as a quick check for an immediate reaction. Our Class 1 site operators know their clientel and they kick out anybody who is not honest about what comes in.

Several of them have chemical engineers working for them, on a retainer, and they do segregate materials. Some containers are emptied, some containers are buried without opening them up, some are incorporated as refuse, and some are just given a grave in the soil several feet deep. And hopefully that area will be monumented and nobody will ever come back to punch holes in it.

I make light of some of the things that are happening, only to keep my sanity, because when you see some of this stuff going around, if I took it as seriously, as I guess I should, I wouldn't sleep nights.

Henry Warren: Several of the previous speakers, including Mr. Vardy have spoken strongly of the joys and benefits of regionalization in solid waste handling.

I come from a State where there are 495 towns, the average size of which is less than 2,000 population, and in most cases less than a thousand. The average geographic size is about 40 square miles.

We're just beginning to get into the solid waste problem. I guess my question is: Does your experience indicate that the joys of regionalization can be passed on to a low population, high-distance situation of this kind?

Peter Vardy: The matter of regionalization really boils down to the fact that when you talk about solid wastes, what creates the region is to some extent political. But to a major extent, in terms of site selection, it has to do with certain geographic, topographic, climate, transport, and economic situations which bear very little relationship to political boundaries.

The other problem that involves regionalization is that the makeup of the body which is responsible for selection of sites is generally such that it cannot possibly do a good job in site selection, because it consists generally of representatives of single-purpose agencies. You have either the influence of engineering or influence of public works on that body. You don't have a well balanced group in the selection process, and this is essential. And it's essential that it be made up not just at the local level but of the entire region for which you're looking for solid waste disposal.

I would really like to see these bodies made up of representatives, for example, from the public sector, works, engineering, health, and finance departments, as well as elected public officials. They tend to be more responsive to some of the social attitudes and the problems concerning the site selection.

They could be assisted by an Advisory Committee from the public at large. I think it's essential to involve the public in the very early stages of site selection so you don't run into all these problems, people appearing at public hearings and tearing your whole project down.

This regional concept, I think, is the best solution to the selection and the establishment of properly located and designed landfill sites. This is what we mean by regionalization.

Now, the role of the State, of course, must remain in a controlled regulatory and advisory capacity with assistance both technical and financial, wherever possible.

The local or the regional body must have the final say in the site selection itself. Of course, you cannot be so rigid in this process that any changes in the development or a particular community cannot change the overall plan.

I am sometimes appalled when reading some State or county reports or waste management studies that have been prepared, which really do nothing more than establish or try to establish the authority of the body for which they prepare their report. If it's prepared for the State, it makes a good case for the State getting very heavily into the regulatory area in the sanitary landfill selection and operation. If it's prepared for counties, they make a very excellent case as to why the county is the proper body control.

My point is that the makeup of the body that controls this process should be a cooperative effort between a local community, the county, depending on whether it's a rural area or urban area, whether it's a special district or metro district. There are many, many other ways of approaching it.

We should start looking at it in the same way we are lookingat sewer utility districts, the way we look at rapid transit districts, where various governmental bodies learn to cooperate and work together. This, apparently, we have not achieved in the solid waste area

William Harrington: I think they're in opposition right now to this idea from the standpoint of regionalization. In the first place, the small towns we hear about have such small quantities that the proper sanitary landfill practices are going to be very costly. We're in a position where the realization is they can combine some of these within the economic long haul cost distances and so be a viable system which can be expanded throughout the life of the State. And they're way ahead of us if they go that route now.

In other areas we just plain can't fund this open area that can be properly located to get the benefit of the haul cost. It seems to me that regionalization is the ideal way to go when you're still in the spread out development counties.

DESIGNING A RURAL SANITARY LANDFILL SYSTEM

Fred Cope*

Synopsis

With the assistance of a grant from the U.S. Environmental Protection Agency, Humboldt County, California is conducting a project intended to demonstrate and evaluate a collection and disposal system for about 10,000 residents in small, rural areas of the southern part of the county.

The study area has been divided in halves, and a series of easily accessible containers has been installed in each for use by the public. In one subarea, waste is deposited in 40 cubic-yard roll-off-type containers that can be picked up and hauled to a central sanitary landfill. In the other subarea, the contents of 8 cubic-yard containers are emptied into a 30 cubic-yard collection vehicle that proceeds to the sanitary landfill when full.

This presentation involved the use of slides showing a map of the area, the containers and modifications thereto, and facilities and topography at the sanitary landfill.

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*Department of Public Works, Humboldt County, Eureka, California

QUESTION AND ANSWER SESSION

Thomas Cavanagh: You indicated there were scales at your site. Is this a unique situation or are scales generally required throughout the State of California?

Fred Cope: It's unique. The EPA told us to have scales. This is the only site where we have scales, but is is very helpful. We purchased the scales used, and including the placement and everything, the cost was about $6,000. And if I have my way at our other sites, which will be larger than this one, we'll try to get some form of scales where we can monitor the type and quantities of the waste we're getting.

Right now we're running the system, but we are going to evaluate whether we want to turn it over to a franchise operation. And I think the key thing is how much money are they going to receive. So scales are important.

Don McClenahan: In that same line, I'd like to ask Mr. Andres if he feels that it's necessary for the State to require that the scales be on every disposal site.

Donald Andres: No, I don't think they need to be at every site. I don't think Fred mentioned that he's getting an average of about 10 tons a day. Sometimes he goes all the way up to 12 tons a day at that site. And adding that scale was really on a per-ton basis and increased its cost.

Some of our major counties do not use scales when they are operating without a service charge, but as a method of control they take aerial photographs and take volumes into consideration. Occasionally, they spot-check loads by running selected loads across scales. Sometimes the highway patrol does it for them, and they get a better idea of volumes that come in per truck.

Those people who are on a charge basis at very big sites find the scales are necessary as a billing mechanism. It does very little about projecting the site life. They are more interested in the volume.

Some of our cities now use scales just to keep better control on their collection system. Mr. Kaufman is here from the City of San Diego. He runs his own sites and brings his own trucks in and he doesn't charge anybody, but he does have an idea what the refuse collectors are doing on the route. He weighs the trucks in each day and he uses the scale as a means of improved collection efficiency.

Don McClenahan: There's no question that scales do offer advantages. My question was, do you feel from a State control standpoint that scales are necessary?

Donald Andres: No; we require that the sites report to us their quantities. We don't care if they arrive at it through weight and we translate that into a volume, or if they do it on a volume basis. We can go back and make comparisons.

What we want is quantity, and I don't care if they weigh it in the truck or if they fly over the site occasionally.

John Talty: For your information, there is an interesting debate going on in the State of Illinois about requiring scales at disposal sites. That's sort of the background for some of these questions.

Mr. Albert Wietz: What do your rural residents do with bulk items at your local pickup station?

Fred Cope: The majority of the bulk items are handled within the system and that's one of the disadvantages of the 8-yard system that we are concerned with. But the 8-yard system does have the advantage that we can run through several specific sites and back to the landfill with one trip. We want to cut the costs down.

If any large demolition work is done in any of these rural areas, we're going to direct them to take the waste to the central site. And I think we'll get a little bit of reaction there. That's one of the reasons why we, in our county, with its size, will probably end up with about four central small landfills.

Kenneth Lustig: I was wondering about the transfer boxes, those 40-yard boxes, do you have a leak problem, do you have a load problem? We have to use a lot of firest roads. We have a load limit on the forest service roads.

Fred Cope: Within Humboldt County we do have forestry service roads, but it seems like every time there are any private landowners along this road they think we will tear up the roads. So we have something like 1300 miles of road. We've only got four major State routes and the rest are county roads. On the forestry roads there isn't enough population there to warrant putting anything out there, so we're on county roads. We are within legal weight limits, though.

Kenneth Lustig: How about load problems?

Fred Cope: In the 8-yard box there is a problem. Its metal to metal and there is a problem but the 40-yard box is water-tight.

Dennis Hawker: Unfortunately, you didn't talk about costs. But I'm interested in whether or not your county could have initiated such a system without having Federal assistance to obtain capital investment of money needed.

Fred Cope: Let me back up a little bit. I think when you look at a Federal grant you look at it with the idea of what can the local agency get out of it. I think it's a realistic approach that everybody takes when they look at one of these programs.

I've reoriented myself quite a bit. Our business manager says, "What you think you're going to pay, double it." Because that's what the local agency ends up paying. I think that's probably true. I think when you go in and look at one of these things you have to be very careful how you look at it.

If we were going it alone, I think we could have developed a system, you know, with assumptions. We could have had it operational and workable with the money we've put in this project, but we would not have had the background knowledge that will be of benefit to us when we expand because we have already noted certain problems about the system. But although we could have something operational, it would have had many faults in it. I think we can justify our expenditures and we will expand.

Dennis Hawker: Would you have had the capital available to initiate the system?

Fred Cope: Yes. Like I say, one-third of our share on the demonstration project, the regular dumps programs, was running something like 60,000 a year, and then we added in for this project something like -- alone, our share was $100,000 just for land acquisition. So we put quite a bit into it.

Walter Erlenbach: We have a rural problem similar to yours. I wondered about utilization. How many of these 100,000 people take their refuse to these places and what sanctions are you going to put against those who don't? We find it very dffficult to get people to quit using their own little landfill out in back of the hill. I'm sure you have this problem. What are you doing about it?

Fred Cope: We initially had 27 dump sites, and we're upgrading four key ones. The Bimbo is what we consider the central or key site.

The county has control over our franchise collectors so we dictate which site or disposal site they can use. We have eliminated all privately operated dumps. There are a few that we call illegal sites in real remote areas, which we have not to date recognized as waste disposal sites.

One of the phases we're going through is a countywide ordinance. The only major stumbling block we have is with one incorporated city that has a form of refuse disposal. It's the only city within the county that has this.

So in a sense, we can write an ordinance and put it into effect and control it. If a private individual, for example, wanted to run his own disposal site, the Health Department could tell him to either bring it up to compliance or close it down.

Walter Erlenbach: You will have that form of sanction, though?

Fred Cope: Yes, I'm sure we'll have to have it in order to control it.

Ronald Nickel: We've been providing this service since mid-1968 in suburbs west of Milwaukee and are having the same problems with these small dumps, burning dump sites being closed down, not being able to afford the cost of a new sanitary landfill.

If you figure up the hidden costs in these new areas, primarily the fire cost, because they would have to contract with the city to get fire protection, we find with these towns that it really costs no more, generally speaking. We've got some eight or nine townships and little villages using this service.

Also, another thing we found that's been a great help in answer to an earlier question, is how to get people to quit using the little dump that they're accustomed to. You've got to transform them into new ways of thinking, seven days a week, 24 hours a day.

We have encouraged townships to install containers at perhaps their city garage, so people all of a sudden leave the old behind and think of it as something new. It has worked out pretty well, getting the people acclimated to certain ways, certain hours. It's been very successful in the last three or four years.

Kenneth Lustig: We did the same thing. We put in across from a grocery store or gas stations and we got good compliance. However, in Idaho we've got problems with the tourist trade. We've got one area that goes from 500 residents up to 1500 in the summer. We don't have a tax base to support that kind of volume. We get camper trailers where people literally move in on wheels.

Do you have that problem and, if so, how do you solve it?

Fred Cope: We do have tourism, and part of our project is to evaluate how we're going to operate in the future.

Any fees collected at this time are turned back to the government so we thought, since we have a consultant evaluating how to fund this project, we're better off not charging. Eventually we may. But when we get to the rural sites I doubt if we will; in fact, I will almost say we won't, because the cost of collecting these user fees is going to far exceed the cost of personnel.

A tourist usually represents some form of income to somebody and this is what our consultant is supposed to be doing for us. Hopefully he will.

Donald Andres: I'd like to comment a little bit further on the Humboldt project.

It's a misconception to think of Humboldt County as 100,000 people. Fred showed that possibly the southern one-third of the county has a population of 10,000 people and the majority of those live in that cooridor area in which there is no container service. What we're doing is promoting refuse collection in that area because a collector already exists, and it's economical to have him there.

Most of the tourism takes place in this area where the resorts contract for extra service during the summer. We have many of the large State redwood forests in this area.

The other thing about financing, where you have these population surges, one of the phrases that has come out of the project is called "the shotgun approach". You only take a little bit off the general property tax, because this is a benefit countywide in the system. We're talking about a recreational tax , maybe a bed tax in the area to help get the transients and then you can start to hit property owners.

One of the fees I strongly endorse is a hook-up fee. When anybody hooks up to a sanitary sewer in the district you generally pay some kind of a connection charge. I strongly advocate that our counties have a solid waste connection charge. Instead of calling it that, you may add a factor onto the building permit. Every time you enlarge a building you pay more, or if you construct something where you generate solid wastes through land usage, you pay for it as a fee to help buy into the fixed system.

The other thing is that legislation just passed in California allows us to assess solid waste charges to the property owner, not based on the value of the property, a general ad valorem tax, but we can assign fees to the property based on its land usage.

The resultant amount of solid wastes we expect to get from that land usage closely resembles the property tax and it can be billed in that fashion. This way we can get the absentee owner to pay for having the system there when he comes in and if its strictly recreational property we will assign a different fee than if it's a year-round occupied property.

So by the "shotgun approach" we hope to get all the people who are benefiting.

Bryan Miller: Do you think it would be economically feasible to operate a system like you described in a county 75 miles wide and 94 miles long with a population of 2,000 people, less than one per mile? Incidentally, this particular county is 80 percent Federal land, leaving 20 percent of a taxable base.

Fred Cope: Our county is about 30 miles wide and about a hundred or so miles long. So we've got a 4500 square-mile area. And as Don mentioned and I mentioned earlier, about 60,000 of this is within the central core area. And about 70 percent of Humboldt County is State or Federally owned.

When we look at these container sites I don't really like to look at them totally from the standpoint of cost per ton, because when you say twenty or whatever dollars per ton, you say, "That's outrageous". But it would be more for an alternate system and when someone moves out in that area you do have a waste problem. And we really have not resolved in our own minds how we're gong to handle it as far as financing.

If you've got a rual area and they got a waste problem, you're going to have to come up with some type of system, even if it's to try to encourage them to drive clear from there they live into the central site.

But we also recognize if we do that that we're going to have more open dumps out there. So we have to compromise. What's economical is, I guess, whatever, you can get out there and pay for.

PANEL B

SANITARY LANDFILL ENGINEERING AND CONSTRUCTION

MODERATOR: John Vanderveld

LAYOUT AND ENGINEERING OF SANITARY LANDFILL SITES

William Harrington*

Obviously, with a subject such as this, you can only get a brief overall view of it in 15 minutes. And in spite of what some of you who know me might think, I will not admit to only knowing 15 minutes worth of information.

The basic difference in a sanitary landfill and the anachronistic open dump is the detailed engineering required in its planning. This engineering, primarily, is a combination of practices historically used in conducting clean earth fills plus some of the practices that have come about in recent years.

As we give thought to how to construct a sanitary landfill and some of the things that are involved, we think of current research, site monitoring, and recently enacted regulations. All of these things must be accommodated by the landfill design.

For the purposes of this discussion, we will accept the fact that we've already determined the waste quantities and types, and the site has been located. That in itself requires a considerable amount of engineering effort, but certainly is beyond the scope of this effort.

The engineering task remaining can usually be broken down into four distinct stages, and we do this in an effort to save the client dollars. The four stages are the preliminary site engineering, the final landfill development procedures, the final facilities design, and then field engineering.

Once the site has been selected, the primary effort must go to the subsurface investigation. Care should be used during this preliminary stage to expend only those engineering dollars that are required to prove site acceptability. You can go the long route if you wish, but you risk losing all of the money you've spent until you know this for a fact.

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The primary task is the subsurface investigation to determine the site geology and groundwater levels. We need this information for a variety of reasons. The groundwater level will help us establish the limit of the depth of excavation for the base of the fill. The geology certainly is important to us to try to determine the underlying earth strata. The same data allows us to determine the quantities and types of cover material we have available to us.

No other engineering expenditure can be justified until this part of the project is pretty well underway, because the use of the site itself is almost totally dependent on this first effort.

Now, as the subsurface investigation is proceeding, it's a good idea to have representatives of the regulatory agencies at least monitor that part of the drilling operation so they're totally aware of the conditions that exist in the field. It's been our experience that they are anxious to do this and are very cooperative.

Upon completion of the subsurface investigation there should be a formal request from the regulatory agency to provide conditional acceptance or approval of the site. This acceptance or approval should be in writing, and it should be or is usually written with the condition that it is approved pending development of proper operating procedures for the protection of the environment and things of that nature. Such action on the part of the regulatory agency, of course, can save much heartache and prevent you from spending dollars which you cannot justify until you have it. In almost all instances we have been fortunate enough to get this kind of cooperation.

After the conditional approval is obtained, then you can start evaluating the site again preliminarily from the standpoint of such factors as its drainage diversion potential, fill volume, operational screening, and access. Each of these items should be developed only to the extent required to show the designer that they can be successfully accommodated in his final design. At the same time you should develop them to the point where you can determine or estimate the basic cost for developing the site, because this has considerable bearing on the value of the site to the potential operator.

At this point in time, you should consider purchasing an option to buy the property. Certainly with a private individual this should be conditional upon obtaining a permit to operate in order that he does not lose the cost of his option. For a public agency developer, negotiations for purchase or, as is more frequently the case, condemnation proceedings can begin at this time.

Now that's basically the preliminary phase. Step 1 doesn't cost a lot of dollars, but it gives you firm background on which to go to Step 2, which is the final development plan.

Once the site ownership is assured, the final operating plan development can begin. Frequently, at this point you will need additional soil borings and, if the geology is irregular as it is in many areas of the country, these additional borings can be significant in number and cost. The borings, of course, will further define the groundwater table, the limits of excavation, and availability of cover material.

At the same time, you can begin the development of the final off-site drainage diversion plans and the final site use. A public agency developer will normally allocate the completed landfill to recreational use as the ultimate site use. This is a good selling point to the community. Everybody likes open space, playgrounds, and recreational facilities, so the public agency does this frequently.

As you're developing the final grading plan you should do it as a cooperative effort with the final user. If it's recreational, with the recreational planner. You have to be very careful though, because your basic charge as a sanitary landfill designer is to get maximum fill volume in your site. That's where you get economy of operation, and the long life. You have to very jealously guard against any attempt on the part of this final use plan to accelerate the filling of the fill by reducing grades. You have to help him with his imagination a little bit. I haven't done one, yet, but I sure do like the idea of ski slopes, high ones.

When the final grading plan is agreed upon, then you can begin to develop the operating procedures which you will follow as you construct the landfill.

At this time you can also begin your design of erosion control plan. If excess excavation is available you must now decide whether you're going to limit excavation required for cover material or whether you're going to market the excess. This is a decision that has to be made for each site and each set of circumstances.

If adequate cover is unavailable on the site selected, you must locate a source and have it made available to you. One of the things that was mentioned this morning by Peter Vardy, which I would like to emphasize, is that while there is a lot of information on the type of material you should use for cover, the fact is, that you almost always use the material on hand and then accommodate the material that you have on hand by design and consideration in your construction. A basic fact of life, maybe that doesn't suit some people, but it's true.

If the quantity and type of refuse are known then you can estimate your truck delivery rates, load count, that sort of thing, which will help you lay out your on-site storage area, your on-site access roads, and provide the on-site storage lanes to accommodate peak vehicle flow rates.

Receiving facilities usually vary in sophistication depending on the life of the fill, the location, and climatic conditions. Normally, the receiving area consists of an entrance treatment of some kind--we have grown to accept this because it helps the public image--a scale, a scale house-office separate sanitary facilities for the landfill operators other than those used by the people driving the delivery vehicles to the site, and some type of maintenance-storage-equipment-fueling facility for the landfill equipment. For sites with a life of up to about seven years, mobile trailers for offices and sanitary facilities and very lightly constructed equipment-fueling-storage facilities are usually considered adequate.

For longer life sites, a little improved entrance treatment such as a brick wall with a sign on it, some planting, and more permanent construction can usually be justified by this longer period of amortization. Modified pre-engineered buildings are normally considered adequate for more permanent construction. We have a broad [illegible] here where we can draw a lot of things from pre-engineered buildings and save some dollars again.

The receiving facility is usually provided with security lighting and fencing which can be arranged to give you access control during periods of non-operation.

The type of fill operation developed should be arranged to give you maximum fill volume. And if you get the idea that I'm one of these designers who tries to get every ton of fill on a site he can get, you're right. Because I know the agony of finding the next one and we don't write them off very fast, and I don't think anybody else does, either.

The trench method, the area method, or a combination of the two is frequently considered. While the trench method has application on some sites, it reduces potential volume and, in my opinion and experience, is being used less and less these days.

In the past we have designed every cell of every fill, however, we recognize that cellular construction beyond that attained by daily, intermediate, and final cover offers very little value to a site. And I'll discuss that one with you anytime you want to.

We have tended to get away from this costly engineering procedure. On a big fill it can be 26 or 30 drawings at $200 a drawing. That's pretty expensive. The basic thing we think you need now is to provide an excavation or site preparation on the plan, a final grading plan which is necessary, and then dimensioned cross-sections through the fill in adequate detail to allow the operator to develop his own intermediate lift elevations just prior to field stake-out. You have to develop those cross-sections anyway if you're really going to calculate the volume of the site, and it's a very simple matter to make these available.

If special wastes are anticipated which cannot be incorporated in the general landfill, you have to have additional provisions for them. And in 15 minutes you don't talk about those, obviously. (Don Andres gave you some indication as to what you're up against.) If special safe-guards are required, they should be worked out with the appropriate regulatory agency at this time. Don't spend all your design dollars running around figuring out what you think is right and then have it reviewed. They'll cooperate with you and be glad to do it.

A sequence of fill construction should be developed which will give the operator flexibility while maintaining proper operating procedures during the filling process. This also allows for phased ultimate site development. It also lets you get out of the maintenance of the completed landfill and gets it over to the final user. This is desirable from an operative standpoint.

While research is being conducted on leachate recirculation and artificial barrier construction for the collection of leachate, at present, most designers try to select sites which avoid these costly concepts. They must be considered, in my opinion at least, in the trial and error early development stages. And they might have potential in the future to allow you to use some marginal sites where savings in haul costs can justify these additional development costs, but most of us try to avoid that at this stage in the development.

When the filling procedure has finally been developed, the operating equipment and manpower requirements are determined by the engineer and included in a basic operating manual. This equipment selection should be done cooperatively with the landfill operator in order to take advantage of his preferences and his existing labor practices.

If the landfill operator has had no experience, he should still be involved with equipment selection so he has an understanding of what you expect the equipment to do. It doesn't do any good just to give him a bulldozer and say, "Here, guy, learn to push the levers." A chart of the equipment and manpower with tasks defined should be put in the operating manual for ready reference. In addition, the provision for back-up labor and equipment should be developed and set forth at this time.

The basic landfill development and operating costs are developed near the end of this phase of the engineering effort. The estimates must be accurate enough to allow for the funding you need and revenue you expect from the operation to set up your cash flow for the project. While this information is often included in the operating manual for public agency clients, the privileged information is more normally transmitted confidentially to the private client. It's nobody else's business.

All of the above operating data and information, with the exception of costs, should be incorporated in an operating manual. It becomes the operating manual for the fill. This should be submitted at this time in draft form to the regulatory agency for review with a formal request for permit.

The value of submitting the draft is that any modifications that are made during the review stage can be incorporated in the operating manual during the final printing and you don't end up with an operating manual with an eight or ten-page supplement, which is going to end up as solid waste.

Monitoring requirements are usually developed during the review and they also are included in the final manual. Half-scale prints of the operation are usually included in the manual for ready reference and full-scale drawings are used for actual construction and record-keeping.

Preparing exhibits for public hearings and things of that nature is basically Phase 2.

Phase 3 is the final facility drawings and specifications, basic engineering, and there's nothing very different than when you design a building. The plans and specifications are prepared primarily to allow for competitive bidding if it's a public client or private direct negotiation.

That's primarily Phase 3 and it's postponed until that time, again to keep from spending the dollars that are necessary until you get the permit. It also gives you something to do during this period of time when the public's telling you what a bum you are for wanting to locate a dump in their backyard.

The final phase is field engineering, and it's one of the most important control devices of any sanitary landfill operation. Each area and each fill lift should be staked for line and grade to guide the equipment operator as he places the refuse and ocmpacts it and places the cover material.

If a site requires excavation, grades are also required to assure that overexcavation is avoided. If a minimum earth barrier is provided at the bottom of the fill, excess excavation depth can destroy this basic groundwater protection.

The subsequent lift stake-out can be used as a check on the grades achieved during the previous filling. A record of this data, when kept on prints of the landfill plan, offers a pictorial chart of fill progress and can be readily converted to in-place densities.

Settlement plates are a good idea. They give you a good indication of what you have in settlement on the fill, and they also help the operator plan his own operation from a control standpoint. That also gives the designer some basis for planning future fills.

An additional engineering service offered by many designers and used by some operators is the periodic inspection and field check which allows him to go out and check the operation for general compliance with the plan. This is beyond the regulatory agency check. They check on the environmental protection.

In summary, while many landfill operators in the past have failed to recognize the need for engineering, it's very uniformly acceptable now. Most of you know the need. The cost for this service is significant but it can usually be reclaimed, as with most good engineering, in improved efficiency and longer landfill life.

ENGINEERING SANITARY LANDFILL SITES FOR VARIOUS CLIMATIC CONDITIONS

William McKie*

When I think about engineering a landfill for winter or wet-weather operation, I think of my friend Herb on top of a 50,000-pound DH Cat combating a mountain of refuse in temperatures below zero with a 25 mile an hour wind blowing. Or consider the same situation when the rain is coming down and if you step off the roadway you're in mud up to your knees. These are the weather conditions under which sanitary landfills are operated in Minnesota, as well in many other parts of the country.

To successfully construct and operate a sanitary, and I stress the word "sanitary", landfill in winter and in wet weather, much careful design, planning, and preparatory work must be done.

First let's discuss the on-site access road. We presume that an all weather road has been provided to the site and is maintained by the local highway department.

The on-site road also needs to be an all-weather road, because usually if your road fails because of weather you are out of business. The road should run, of course, from the entrance all the way back to your landfill area. It should be designed or constructed to withstand heavy loads in wet weather as well as in freezing weather. The surface should be blacktop if possible, but more likely will be made of gravel or crushed stone.

The road needs regular maintenance to remove chuck holes, bumps, and ruts. This is especially true in late fall before it freezes, when these ruts and bumps will be with us all winter. This can be very damaging to your customers' trucks as well as to your own landfill equipment. The bouncing of the trucks further disintegrates the road bed, thus adding to the problem.

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*President, McKie Associates, Burnsville, Minnesota

In building a road bed, it's well to build it higher than the surrounding area, particularly where there's considerable snow, because the wind will tend to keep the road clear of snow. Of course regular snow plowing is probably necessary in some areas. We also like to make sure the trees and brush are removed from the sides of the road as far back as possible to avoid the "snow fence" effect of trees and brush.

The drainage ditching on both sides of the road should be designed and constructed to keep the road bed as dry as possible in wet weather and during the spring thawing period. A dry road bed also helps to minimize or prevent frost heaves and frost boils and consequent road breakdown during thawing periods.

The ditches should be capable of handling the snow melt run-off in the spring and should be so graded as to prevent standing water at the roadside. Culverts should be provided where required and should be serviced just before winter comes to make certain they are clear of obstructions and at the proper elevation to handle the spring run-off.

It's also important to have a storage pile of washed gravel or crushed stone located near the road so this can be used to fill chuck holes or to improve the surface where it fails. The stockpiled gravel, in some cases crushed stone, or perhaps incinerator ash can be used also to provide a surface on new landfill service roads to the immediate landfill area, which change as the fill proceeds. Most of the time you can construct this road in decent weather as part of a cover material operation, but during wet weather or spring thaw, you are required to put in a more substantial road. So this stockpile becomes very important in wet weather and, of course, in the spring thaw period.

Another exceedingly important consideration, which has been stressed before, is drainage. As we all know, maintaining drainage control on a sanitary landfill is vital to preventing water pollution. It is also critical to keep the water out of your operational area to prevent an otherwise suitable work surface from turning into a quagmire when a rainstorm occurs or when a quick February thaw comes along.

Thus drainage ditches must be constructed around a landfill to keep surface drainage away from it and, in particular, they must keep drainage from entering the active fill area; other ditches should be constructed so they receive drainage from the active area. These drainage ditches, in colder country, must be planned and built in the fall before frost occurs to be most effective, because nobody wants to put in a ditch through three feet of frost on the ground.

Obviously, careful planning is necessary so that the ditches are useful four to six months later, when the snow melts. It is necessary to have a knowledge of the planned winter progress of the landfill in order to properly locate the drainage system so it will not be covered by refuse by spring. In regions where extremely wet weather occurs, it's useful to put in a bad weather temporary site near the entrance to the landfill or at least near the good part of your road.

On sites which have soil conditions, like clay, where you have periods of extremely wet weather, the road may become unusable and prevent access to the usual unloading area. At that time it's well to have an alternative site ready to be used. This site is prepared previously and has a limited capacity and is close to the entrance or accessible roadway. It is used only when weather conditions absolutely require it.

Now we come to the problem which is probably the most predominant in cold weather operation of a landfill, obtaining cover material. Because a sanitary landfill is not "sanitary" unless it receives its daily cover of six inches of compacted clean earthen material, one of the most trying and difficult problems of wet weather and winter operation is obtaining and maintaining an adequate supply of usable cover material. Wet weather difficulties can be minimized by having a well-drained area available for excavation or by maintaining a cover material pile which is well drained to be used only during wet weather operation.

In Minnesota, the wet weather problem mainly results from frost. The amount of frost we get is anywhere from three and a half feet into the ground to seven feet in the northern part of the state.

There are many more or less successful methods in use for assuring a cover material supply in frozen ground. They are based on insulating the material to retain its heat, stockpiling it to dry it and reduce its moisture content and make it easier to work with, or chemically treating it to lower its freezing point. There is another alternative and that is to provide your tractor with a ripper and rip the frozen topsoil off to get at the unfrozen material underneath.

We know one gentleman on a small landfill who saves the bags of leaves that his householders bring in and puts these in a pile and spreads them out over a portion of the site he plans to use in the coming winter for cover material. We also know of operators who use straw or hay. Another fellow saves building materials, such as the insulating panels off of ceilings and demolition material, and he places them on his cover material pile. He claims the insulative material also sheds the rain and allows the pile to dry, making it easier to use in winter.

It's almost impossible to provide cover material in very cold weather at landfills which have mostly clay type soils. On these sites, the operators usually provide a second source, probably in a local gravel pit or some other such area.

We know of one operator who builds up his cover material pile all summer long. He runs an excavating service and as he brings in cover material he applies calcium chloride to it before he dumps each load. He's done this for three years without any problems.

Most major landfill operators in the State dig their cover material as they go, and they are fortunate enough to have sites where the soil material is suitable. However, they protect the area by preventing anyone from walking on the snow over the area where they're going to dig in or from driving snowmobiles or trucks or even running their own machines on it. They dig the sod progressively through the winter, and on the worst days they encounter probably six to 12 inches of frozen soil in their usual digging place. And they get by with using a tractor to knock this loose.

Of course there's the alternative to protecting the cover material and that is to provide a ripper on your tractor and actually tearing up the frozen ground and then getting at the unfrozen soil underneath.

Another vital element of design is providing a good building in which to keep the equipment. We've seen major landfills operate without protection for the equipment and it results in fantastic wear on the equipment because of neglect and the lack of maintenance. The operator certainly doesn't want to be out there servicing his machine when the weather is below zero and the wind is blowing.

Another important aspect is providing adequate fencing around the site. Whereas the snow will cover up most of the unsightly litter in winter, the coming of spring reveals the widespread accumulation, if fencing is not provided. Snow cover also makes periodic pickup on neighboring properties impractical unless you can find a Boy Scout Troop that wants to practice on their snowshoes, and this is sometimes done. The fence has to be strong enough to stand the force of the wind when plastered with an accumulation of plastic bags and paper. It should be cleaned periodically to maintain its effectiveness.

Probably more important is the portable or movable fencing which is placed on the leeward side of the active unloading area. These sections should be at least 10 feet high, and we've seen some operators build them 16 feet high. It is important to build them so they move easily in snow and yet be heavy enough to keep them from blowing over when covered with litter.

It's also important in cold country to provide snow fencing for your roadways. In some places we've seen, snow fences are placed on the windward side of the landfill to keep snow out of the landfill.

As far as the site preparation is concerned, in designing the work we look at the terrain, the drainage, the soil conditions, prevailing wind direction, available screening, and the size and type of earth moving equipment for the site. We usually do this in consultation with the operator.

We also concur with the last gentleman's statements with regard to putting as much refuse as possible on the site and we look at the economics of moving the least amount of earth to do this.

We feel that the trenching method is useful, perhaps only where the soils are fairly granular and mostly we've seen the area fill method in use or the progressive slope method, which is a modification of it.

ACHIEVING MAXIMUM COMPACTION IN A SANITARY LANDFILL

Wayne Trewhitt*

Synopsis

Mr. Trewhitt's company operates two sanitary landfills, one at Mountain View, California and the other near Reno, Nevada.

He said that at the California site, the company is required by contract to obtain a 1200-pound-per-cubic-yard compaction of the waste, because the site will be used as a park when it is completed. The company considers it essential to keep the working face as small as possible and is able to do so by using specialized unloading procedures. Hard-to-handle objects, such as water heaters and washing machines, are crushed on the ground by an 80,000-pound tractor before being spread on the face. Numerous slides were used to show the equipment and techniques employed.

There is no requirement to achieve a similar density at Reno. He described the operation there as being fairly typical of smaller sanitary landfills elsewhere in the country. Much stress is placed on maintaining a small working face, and slides were shown to depict the unloading, spreading, and compacting techniques followed.

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*Vice President, Easley and Brassy, San Francisco, California

QUESTION AND ANSWER SESSION

Albert Weitz: Wayne, you're obviously working with very sophisticated contours in that San Bruno operation. What sort of ratio do you have in cover material to solid wastes?

Wayne Trewhitt: They project five to one.

Albert Weitz: Are you able to maintain that?

Wayne Trewhitt: Fairly close.

Bob Redding: I've got another question for Mr. Trewhitt. We have a running feud with the equipment salesman. We say there is no need for compactors on our small landfills. What size, in your experience, would you recommend where land is not too expensive?

Wayne Trewhitt: I think it depends on the ultimate end use of the land. We found in smaller operations a crawler machine of one type or another is much more versatile and can do more jobs and do them better. If compaction really isn't required, like it is in Mountain View, you're better off to stay with a more versatile machine. If you have a high land value and a high end use, then it's very important to get compaction. The more, the better.

John Vanderveld: I might add, too, that the more compaction achieved during the fill in practice, the more value the land is going to have afterwards due to its stability.

Robert Mithcell: Mr. Trewhitt, what is the operational cost of obtaining the 1200-pounds-per-yard compaction?

Wayne Trewhitt: We handle about 2300 tons a day at that site. We operate one 9-hour shift with one D8 and one 826 compactor, both running around sixty-five to seventy-five thousand pounds. That's all the equipment that's required to achieve that density in that one site.

Robert Mitchell: What is that figure in dollars per ton?

Wayne Trewhitt: You can operate each machine for about $35 an hour, so we're talking about $700 a day. We're looking at thirty cents a ton for just the placing of the waste.

John Vanderveld: We have so many variables in the different landfills, depending on the labor costs, the terrain, the location of the cover material, the type of material that comes in, even the moisture content in the material. It's somewhat dangerous to take a flat figure and say this is what it costs.

Mr. Trewhitt: I was trying to be as broad as I possibly could, without getting myself into a lot of trouble.

John Charnetski: Mr. Harrington, what are some of the major constraints you are confronted with in determining how much waste you can put into a landfill?

William Harrington: Primarily it's the amount of excavation you can achieve before you destroy your groundwater protection and the final grading plan which has to basically be developed, based on final site use.

There are other things, obviously, such as the drainage and what you have available to you in terrain and things like that. But the main constraints are how deep you go and how high you go. What you try to do is work with the final land user, again trying to get it out of the control of the refuse disposal operator and into the control of the operator of the final use.

Francis Fyles: The Department of Interior keeps coming into this stating you cannot have any chemicals at all into the underground water. This is quite a change in our concept. We had always felt that we could cap these throughly enough so there would be no chance of leachate. But they're starting to say that it's impossible. Any comment on that?

William Harrington: There probably is no more misconception in any area today than what kind of a protective barrier you should provide to protect underground water. We have heard some differing requirements. We have heard a rule of thumb of a foot of earth per foot of fill. You know, something aiding the ground, recognizing the earth itself has some correcting capabilities. We look at the old days of trying to get about five feet of a pretty good impervious clay cover, and hope you get a little more. That may have been a little naive.

Basically you try to design your landfill and develop operating procedures, on-site preparation, off-site drainage, things of this nature, so you don't get water running through the fill as it's placed.

You establish your filling procedure so that water that falls on the refuse is diverted away and down on clean earth to the silt pond there rather than have it go into the refuse itself. We do all kinds of things like this to keep from exceeding the field capacity of the refuse that's placed, because we know if we don't exceed that field capacity at least it's not going to move off the site. So this is one of the primary things that most of us do today.

I know there are some other things being done with this business of the impervious barrier. You show me one that will last forever and I'll be very happy to look into the economics of applying it. I don't know one, yet.

So usually when you find leachate, for example, on a fill, it will be spotty. If you go on this concept I'm talking about, trying to get all the water around it and not exceeding the field capacity, you can handle that.

Then if you do get into areas where you have large quantities of leachate and you have a good barrier underneath, there has been no testing yet that we've seen in this country--and I guess if I interpret what I heard earlier this summer or fall on the United Kingdom experience--there is no indication that even from the fills with some pretty doggone stuff in them, with the clay barrier, that's a minimum of five feet, and some of that questionable, that you really have any chemicals down into the ground water or significant degradation.

Now we all know that hardness is increased. We got a little CO_2 going down, and some things like that, but some of these arbitrary regulations that people come up with because they don't have enough information to develop realistic ones can be pretty tough to live by.

And I can't tell you the answer to that, except to try to apply the best technology you have today and then test it. That's the way you're going to have to develop the background.

Louis Olive: What criteria does one use when you consider the trench method versus above ground sanitary landfill methods relative to the water table and the economics involved.

Wayne Trewhitt: On the trench method, you can only go through once so this is going to limit the use of your land. If you can use an area method, it doesn't have to start at ground level but can go down to the same depth as your trench method can, which we're doing in Mountain View.

As far as the water table is concerned, it depends on what's in the water. Is it potable water? Is it perch water table, is it usable groundwater? Then how do you go about sealing the waste from the water? It's all a matter of economics and how valuable the land is and how you want to proceed, and what the rules and regulations are of the governing bodies that are going to regulate you.

William Harrington: I'll tell you how I figure when to use the trench method. If you have a small operation where you really can't justify a lot of equipment and you have relatively inexpensive land and plenty of it, then you can go in and have a trench excavated which can be drained naturally after it's excavated.

On a rental equipment basis, you can put pans on the job for two weeks, let them dig your trench that will last you for three months. Then you can operate your fill with one relatively small piece of equipment. Now this is a proper application of the trench method.

If you have a large fill and you have land that's difficult to get and you have equipment on the site anyway, which will allow you to set up a day-in-day-out operation for each piece of equipment, you're better off to go ahead and excavate. Because if you can excavate it to the bottom of the trench you can also excavate it and build yourself an area fill or the advancing slope, which is the modification.

Use the material you have, stockpile it for future cover. You can also do that with the trench method, but you're limited to the amount of earth taken out of the trench for covering the trench and also cover for succeeding lifts, unless you're going to borrow from another part of the site.

But the best use of it that I can find is in this first example, where it's a small operation, something under 35 tons a day. In that league you would use rental equipment, get them on and off the job and then settle down to your day-in-day-out operation of placing the cover with a small frontend loader.

Edward Heil: Mr. Harrington, you stated you liked ski lifts and the higher, the better. What is the cost when you start getting over a certain height relative to working at a lower area of the land?

William Harrington: Every time I get facetious I get caught. I never did a ski lift in my life. But it's a good question and it's a reasonable question.

I don't have cost figures to give you but I could tell you the kind of thing you're into. As you start going up, each lift gets smaller. You have the difficulty of maintaining your access roads up a fairly steep incline unless you have a big area where you can make the sharp grade on one end.

You have to at least have cover material somewhere or a stockpile of it if you really go many lifts above ground, and it can be costly because of the multiple handling of the cover material and more costly road construction to get your refuse trucks up there.

It was meant to be a little bit facetious and only to emphasize the point that we try to get as much refuse on a site as we can.

William McKie: We made an analysis of a ski hill and determined that on the overall basis, the cost of handling material to build a ski hill was approximately one-third more than on the usual slope.

William Harrington: For the benefit of the gentleman from the Virgin Islands, on a small operation he could have both ends of this, he could go pick up all the dirt, let's say, four foot off of the groundwater or whatever the regulations are in your area, on the trench. The material you stockpiled, you may put successive rows which would create artificial trenches and just put it together like a layer cake until you reached a desired elevation. That way you can keep your landfill nice and clean. You can minimize the size of your operation.

William McNulty: Mr. Trewhitt showed us what he did with one tire but I was wondering if anyone on the panel had any experience with tires when they come in truckload lots from a retread factory, for example.

Wayne Trewhitt: Yes, we've had that experience, too. We just spread them out on the working face as far as possible and cover them like we did that one tire.

If you're putting them in a deep canyon fill, it really doesn't make any difference whether you spread them out, because the weight of the additional lifts will eventually crush them down so you remove the voids when you get into your last lifts. But definitely they should be spread out and covered almost individually.

William Harrington: We had one experience where that was successful. Normally, if you spread and work your fill a lot, trying to achieve compaction, they're going to work right on up unless you really get enough on them to hold them down.

In one area, we designed a landfill that was next to a flood plain. Since the tires were inert and since the flood plain was dry, stable and high enough to allow you to work equipment on, we actually went in and excavated pits, filled them with the tires, backfilled with material and took the excess out. This was an inert material filled in a flood plain. We did not raise the level of the flood plain and it didn't seem to hurt anything. That's the only time I've ever seen tires handled in bulk successfully.

William Culham: I'd like to second what Bill Harrington said about burying tires. We tried that in the Portland Metropolitan area. It was a flood plain type of installation.

We have also been looking at individual tire grinders and this goes back to another process of pre-treatment of any kind of waste before it gets to a landfill type of operation. This has been mentioned today.

We have a tire grinder that's been operating on a landfill for about three months. Down time is relatively minor. They can run between 1,000 and 1,500 tires a day if they learn. It does a couple of things. It prepares the material in such a way that those of you who are operating in wet weather or snow--the pieces of rubber are somewhere in the neighborhood of three to four inches--can use the material to obtain some running surface also.

John Vanderveld: There are a number of manufacturers on that. I know we have done the same thing in some of our landfills, where we have cut them into smaller pieces in order to take away some of the buoyancy of the tire. But I think, basically, if the tires are buried under sufficient weight they will normally stay put.

Dennis Fenn: I'd just like to comment on two projects that involve high groundwater table problems. One is in Virginia Beach, which Mr. Dorer of the State Health Department dreamed up several years ago, and it's completed now. I'm sure most of you have heard of it. They're making it into a recreational area, presently seeded and a soap box derby track has been constructed on it. They have developed some information which we at EPA are in the process of getting out. They do have some cost and some monitoring information.

In Orlando, Florida, they tried a different approach, where they actually went in and lowered the groundwater table, which gave them the ability to trench down four or five feet and still stay a foot or two above the groundwater. They are presently comparing this to the method used in most areas in high groundwater table areas. They're comparing it environmentally and economically to dumping it on top of the groundwater table, both types of operations. There's some information on that, also.

THE NEW EPA SANITARY LANDFILL GUIDELINES

Truett DeGeare*

I assume that having read the program for today, you are all aware that the Environmental Protection Agency is proposing to establish sanitary landfill guidelines. Before I begin to discuss them, I wish to make one clarification. This is not the booklet, which some of you may have seen, called *Sanitary Landfill Design and Operation*. The guidelines are completely separate from that publication.

I hope in this brief discussion to answer some rather basic questions regarding the guidelines, why we have them, to whom they would apply, and what they are.

The management of solid waste generated by Federal agencies was first subjected to Federal control in 1966. The thrust at that time was not to control solid waste management but to control air pollution through prohibition of open dumps and burning of solid waste in urban areas.

The first definitive control of Federal solid waste resulted when the Solid Waste Disposal Act of 1965 was amended in 1970 by the Resource Recovery Act. In this amendment Congress charged the administrator of our agency "...in cooperation with appropriate State, Federal, interstate, regional and local agencies, and allowing for public comment by other interested parties... to recommend to appropriate agencies and to publish in the Federal Register guidelines for solid waste management systems."

It was further required that these guidelines be consistent with public health and welfare, air and water quality standards, and adaptable to appropriate land use plans.

The Solid Waste Disposal Act, as amended, requires that Federal executive agencies comply with guidelines developed by the EPA. Compliance with guidelines issued under this authority is required of: Each Federal agency having jurisdiction over any real property or facility which involves solid waste disposal activities; each Federal agency which permits the use of Federal property for the disposal of solid waste; and each Federal agency which issues licenses or permits for disposal of solid waste or which conducts activities which generate solid waste.

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*At time of presentation, Chief, Land Disposal Section, Office of Solid Waste Management Programs, U.S. Environmental Protection Agency

The sanitary landfill guidelines are the first indication of the intent of the Administrator to promulgate guidelines for solid waste management. Other guidelines dealing with other process and unit operations, for instance, special requirements for handling of pesticides and other hazardous wastes, will be promulgated later.

We began development of the guidelines shortly after passage of the Resource Recovery Act. However, efforts had begun much earlier with our predecessor agencies in developing state-of-the-art documents on which sound guidelines could be based. These efforts resulted in the document Sanitary Landfill Design and Operation, copies of which are available here today.

In developing this document we utilized the knowledge and skills of individuals recognized in the field of solid waste management to review and write significant sections. In addition, the document was reviewed and critiqued by a variety of Federal agencies; all State solid waste agencies were solicited for comment, and a variety of professional organizations was also requested to review and comment on the draft documents. This rigorous effort resulted in an authoritative source document on sanitary landfilling.

The guidelines presently proposed underwent a similar development and review by Federal, State and local agencies, as well as appropriate professional organizations. They represent in their present form, the final judgments on the part of EPA regarding what is required and necessary to assure both environmental protection and acceptable design and operation of sanitary landfills. They represent objectives that are achievable using today's technology while providing flexibility for unique and specific climatological, geological, geographical, and related conditions.

Sanitary landfilling is the most widely applied and only environmentally acceptable land solid waste disposal method available today. A sanitary landfill is an engineered land disposal facility at which solid waste is spread in thin layers, compacted to the smallest practical volume and covered with soil each operating day in a manner which minimizes environmental hazards.

The sanitary landfill guidelines are intended to provide for operations that will have minimum impact on the environment, and they will apply to both existing and [illegible], Federal agency installations.

The guidelines do not establish new standards but set forth requirements to ensure that the design, construction, and operation of sanitary landfills meet the health and environmental standards for the area in which they are located. Federal agency sanitary landfills are also expected to conform to applicable state and local requirements where they are or become more stringent than those contained in the guidelines.

The guidelines are presented in the form of Performance Requirements and Operating Procedures. The requirements delineate minimum levels of performance required of general use sanitary landfills. We recognize that it is possible to construct a sanitary landfill on nearly all topographies, although some land formations present unique problems.

While it is impossible to delineate all the techniques required at every potential site, the Operating Procedures, which support each basic requirement, are intended to emphasize specific items of concern and guide designers and operators of sanitary landfills in satisfying the requirements.

Owners and operators of sanitary landfills are expected to employ the most efficient engineering methods available to satisfy the requirements. The operating procedures represent such methods based on current knowledge for meeting the requirements.

If techniques other than those specified are used, it is the obligation of the proposed facility's owner and operator to demonstrate to the responsible agency in advance that such techniques will, in fact, meet the requirements.

There are 13 specific areas covered by the guidelines. First, requirements which we categorize as "General": (1) Federal agencies must comply with applicable Federal, State, interstate, regional, and local standards where they are more stringent and with the National Environmental Policy Act of 1969; (2) open burning and open dumping are prohibited; (3) design and operating plans must be developed and submitted for review and approval. Other areas addressed are water quality, air quality, aesthetics, gases, vectors, safety, site selection, cover application, solid waste accepted, hazardous and special wastes, equipment, and inspections.

I don't feel that it would be advantageous for me to read to you each of the requirements and operating procedures. This is especially true in assuring that specific items within the guidelines are considered in the proper context. The Introduction, Definitions, Requirements, and Operating Procedures which comprise the guidelines should be considered as a single entity. However, only to indicate the structure of the guidelines, I will read as an example the language of the section titled Vectors. "Conditions shall be maintained that are unfavorable for the harboring, feeding, and breeding of insects, birds, and rodents."

Within the section there are two operating procedures. "A. Plans shall include contingency programs for vector control and the operating authority shall remain prepared at all times to implement these procedures. B. All solid waste shall be covered by the end of each operating day."

In summary, I submit the intent of these guidelines is that of freeing sanitary landfills from the stigma of being catch-alls for any and all unwanted materials and of placing them in the realm of an engineered method of solid waste disposal based on the protection of the environment and health of the nation.

QUESTION AND ANSWER SESSION

Bryan Miller: The statement that all the States were requested and did review that document, or any predecessors, is not true. Even though New Mexico requested of the Dallas Regional Office preliminary copies, we were refused a look at them. The question I pose to you is, did EPA in the development of this document bother to visit the various States to see the conditions that existed before they adopted or wrote such a document?

Truett DeGeare: Our agency has been routinely visiting the States and observing the conditions, not only for purposes of developing these guidelines but as part of our normal program. I will look into the matter of whether or not you were able to review a draft copy.

Bryan Miller: Will you tell me the individual who came to New Mexico to look at the conditions?

Truett DeGeare: I can't tell you at this time, no. I would also like to add that these guidelines are presently under development. The process of promulgating them includes publication in the Federal Register. When they are published, a statement will be included to inform those desiring to do so that they may comment directly to our Agency regarding the contents of the guidelines.

John Vanderveld: Truett, what is your office doing in adding to the guidelines for such concepts as milling of refuse?

Truett DeGeare: The overall concept of the guidelines is to provide requirements based on maintenance of environmental quality. In doing so there is flexibility to allow for operations of various designs, and that includes those types of operations.

John Vanderveld: Is it the intent to develop, then, operating standards?

Truett DeGeare: No, that is not the intent.

Keith Kelton: I have a question regarding the responsibility or conditions the regional office will place on the implementation of these guidelines. Will they have the latitude to make judgment decisions in cases where your guidelines cannot be all inclusive, such as places where sanitary landfills are not applicable, even for the recovery of incinerator residue? This would apply in permafrost areas.

Truett DeGeare: I feel that there is an inherent flexibility in the guidelines, and this will require interpretation. Now the interpretation is going to be a policy matter which will be established by the Agency.

H. Lanier Hickman: I'm with the Office of Solid Waste Management Programs of the EPA. I want to add something further to what Truett said.

Recognize first that these guidelines apply only to Federal agencies. That is the limitation of the law, and that is the application of the law we presently operate under.

There is an inherent flexibility within the guidelines which I think all of us who have worked in the field for a long time know you have to have, because you cannot write a standard or a pseudo standard that's going to be applicable precisely in all instances, in all conditions everywhere, under all circumstances.

There is no procedure built into the guidelines at this time or within the management of the program that will allow for regional variations which will not comply with the basic requirements of the guidelines.

We have a lot of work going on in leachates, gas control, and milling. All of these are areas that will have to be built into our requirements of Federal agencies at a later time. All of you, I'm sure, are aware of the amount of effort we are putting in up at Madison on the milling project. Bob Ham, who will be here later, has done a marvelous job working on this project.

We have a present position statement on the use of milled landfills which we are getting ready to modify slightly based on the most current information we have from our efforts in Madison. We are also trying to visit, collect data, and ascertain the results of this same type of operation in other parts of the United States where the climate, geography, and the characteristics of the area differ from those at Madison.

Contrary to what the gentleman from New Mexico says, I personally sent copies of the draft guidelines to every State. I won't debate it here with him. I'll debate it separately at a different time, because this is no forum for that. But we did solicit comments from all States.

Kenneth Lustig: I want to know, on Page 37 of the guidelines it says no burning of waste shall be allowed in a sanitary landfill. Has EPA looked into these air curtain destructors. I know they are using them in Montana, Virginia, and St. Louis. If so, do you have any comment?

Truett DeGeare: There is a direct prohibition of open dumping, so you can assess that type of process as maintaining environmental quality. Consider it as controlled burning rather than open burning, then you may do so.

Kenneth Lustig: Does EPA have any standing on the utilization of that type of machinery?

Truett DeGeare: Our standards meet the environmental standards.

Grant Walton: If the States have more stringent guidelines than the current Federal ones, will Federal installations be required to meet the State guidelines?

Truett DeGeare: Our guidelines say yes.

Marvin Reid: Since the guidelines are being drawn up for all Federal agencies, would this include any dump that receives any waste from a Federal agency, such as a post office, soil conservationist office, or anything like that?

John Vanderveld: The question is, does it apply to government disposal on a site for any purpose?

Truett DeGeare: I read very specific cases in which the guidelines would apply and basically what one of them said was that the guidelines will apply to a Federal installation that produces solid waste.

Robert Robinson: I have no complaint about not receiving the guidelines, but we received about three sets and they progressively got worse.

We had no real serious complaints with the original January issue that I received, but a case in point is the fact that the January issue talked about a 50-year design flood. Here they talk about the idea of using engineering to lay out a landfill so it will be properly upgraded, and then they come along and say in the January issue you report designing to take care of a 50-year flood. I agree with that 100 percent.

They ought to certainly have flood protection to 50 years, maybe 100 years. But the last issue, in September, reports that the bottom of that landfill has got to be above the 50-year design flood, and that leaves no opportunity for engineering design. They are eliminating the possibility to properly engineer. They're getting it down to you becoming a technician utilizing their regulations, and they're leaving no alternative to the States to establish their regulations because from what we've just heard, every landfill in every State, except maybe one or two percent, is going to receive some small amount of Federal waste.

What you're going to have happen is to have countywide and regional systems which we're trying to promote and then the Federal government is going to have to come in and spend a lot of money to take care of a few tons of Federal waste in some areas, to take care of the waste the way they want it taken care of.

Fortunately we don't have construction grants to control us in the way that they do in water pollution, but it looks like they're going to do it through other means.

Truett DeGeare: May I ask if you have a copy of the guidelines?

Robert Robinson: Yes, I do.

Truett DeGeare: If you would check the statement about flood plain, it's not a requirement, it's an operating procedure. And as I stated, these operating procedures are intended as guides.

Robert Robinson: It's under Section 2, Requirements.

Truett DeGeare: That's correct, under Section 2, Requirements, there's a requirement 2.1.0 and under that requirement there's a section called Operating Procedures, indicated by 2.1.1. And it's within the operating procedures that you will find that statement.

Robert Robinson: I don't see that it makes any difference.

Truett DeGeare: It's a significant difference. A requirement is one based on maintenance of environmental quality. In order to do that, if you would read the introduction, there is a provision for flexibility in design in meeting those requirements. According to the introduction and my previous statement, the operating procedures are there merely as guides to meet the requirements.

John Vanderveld: As I understand it, there is a meeting being held tonight with the Federal EPA and State representatives at which there's going to be further discussion of the guidelines. If so, perhaps some of these questions could wait until then.

As I understand it, the guidelines are still being reviewed and being worked on. It is the desire and the hope of the private sector and the planners and designers that these guidelines be further developed jointly so that the input from everyone involved in the development of sanitary landfill systems can be added. This has been the attitude that's been displayed throughout the development of the guidelines to this point and I'm sure it is continuing.

Carl Sexton: Has it been said that once these guidelines are adopted, that every landfill operator, whether private or public, will have to comply with these guidelines if he accepts any refuse from any Federal agency?

Truett DeGeare: The burden will be on the Federal agency to comply with the guidelines and proper disposal of wastes which they generate.

Carl Sexton: My question is, does the operator of the landfill have to comply with these guidelines? That's my question.

John Talty: If he's under a contract with a Federal agency, then he does. If he's under a contract with a Federal agency to dispose of its solid waste, he would have to meet the requirements of the guidelines. But the burden is on the Federal agency.

Charles Scott: If that's the case, then, when we draw up a contract with the Federal agency and it inserts that particular clause as having to comply with the Federal agency's recommendations, then the responsibility after we have accepted that contract is going to effectively become the responsibility of private sector for compliance, not the Federal agency, because they've already done their bit. Is this right?

John Talty: I'd say you would want to charge them appropriately for the service you provide them.

Samuel Hale: Changes will be made in the guidelines prior to their going out as actual semistandards. In addition, Federal agencies will be required to develop implementation schedules meeting both the municipal incinerator guidelines and the sanitary landfill guidelines. That is, the two guidelines do not immediately take effect for all uses the next day, rather implementations will stretch over some period of time.

Whether that's a one-year, two-year, or three-year period, that's difficult to say at this time.

John Vanderveld: Who can make comments on these guidelines and submit them to your office?

Samuel Hale: Anybody can make comments on these guidelines. The primary commentators we are looking to are all the State agencies and people operating in the field, but any public citizen can make any comment he desires.

John Vanderveld: Have you developed a method for receiving these comments or could you give some guidance to the people who are in the room as to what procedure they are to follow in submitting comments to your office?

Samuel Hale: When the guidelines are formally published in the Federal Register, which I suspect will be no less than one month from now, we will try to publicize that publication formally through the journals and so forth. When we do that, there will be a formal address where comments will be received. Obviously, the best place to send comments is to my office or John Talty's office.

Charles Scott: I am very concerned about how we, the private sector, can get into our hands in time to reply to the publication in the Federal Register, the contents of whatever that publication is going to be. Because it seems to me, if we only have 30 days after it gets into the Register and into our association publications and we get it and read it, the first thing you know, it's Christmas time again. If we're going to be allowed to comment on its content, I think there ought to be some way that our association would make that publication available to us immediately.

Truett DeGeare: On behalf of our Agency, the Federal Register is the means for disseminating the proposal and we're doing our part.

Charles Scott: The Federal Office would become very, very busy if one day all private operators from the State made a journey to review it, because that's the way we would have to do it.

Eugene Wingerter: Within the last few weeks we have distributed many copies to the States. Now there are over 200 members of the Institute and I think one of the most practical ways of disseminating this information is when it is published in the Federal Register, we'll send out a special bulletin.

I know many of you don't receive the Federal Register and probably wouldn't see this unless it was disseminated to you.

We'll have a list of names of the members of the Institute and, as I mentioned this morning, anyone is welcome to join the Institute. For those of you who are not sure whether you are members, sign up out there and we'll see that you're on the mailing list and we'll send you copies. You can in turn respond either directly to EPA or you can send it back to NSWMA and we'll give them to EPA for evaluation. This is probably the most expedient procedure I can suggest at this time.

Alfred Chipley: I'm kind of simple so I'll just ask a simple-minded question. I think these things are marvelous. They're unworkable, perhaps, but marvelous.

Solid waste is really all inclusive. I think I read one of your guidelines which said all wastes shall be covered daily. And somewhere else it says that no wastes shall be deposited within the water table. Now did you mean all wastes, demolition waste, bricks, stuff like this?

Truett DeGeare: That's correct.

Robert Silvachi: A question to anyone on the Board. Are there any existing methods known whereby you can treat sanitary landfill drainage successfully?

Wayne Trewhitt: Emcon--Pete Vardy, who spoke a little earlier this morning,--is doing a study for EPA in California in which they're actually recycling leachate back into the waste, and there have been some studies done on algae. I'm not too familiar with those who clean up leachate, but I think there have been some studies done, and they're continuing.

William Harrington: One of the things you do, at least with sludge, is pump it back up onto the fill and let it filter through the soil, which is essentially what Peter Vardy is doing out there.

The other thing is very basic. It depends on what you are after. If you just slap some chlorine in your siltation pond it becomes a double duty device. If you have a pond that allows you to collect and do some treatment prior to discharge, chlorine still works. It depends on what you are after. If you have heavy metals, there's not much you can do except get it on the ground somewhere to filter.

PANEL C
DEVELOPING SANITARY LANDFILL PROGRAMS

MODERATOR: Gerald Neely*

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*Director of Engineering, Mid America Regional Council, Kansas City, Missouri

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THE ROLE OF THE STATE IN LAND DISPOSAL

Floyd Forsberg*

It's a pleasure for me to be here to discuss a little bit of Minnesota's program with you.

We're related with air, water, and solid wastes, and now noise pollution, and I've been asked to refer my comments to State land disposal policies, communications and public education programs, and coordination with and assistance to the local governments relating to landfill programs.

In Minnesota, the land disposal policy involves a regional county-controlled system. The system relates to the collection, the transportation, the intermediate reduction, and ultimate disposal of landfill practices.

I'd like to give you a little bit of background relating to Minnesota. We have approximately 900 open dumps, 87 percent of which are burning, 85 percent are salvaging, and 25 percent have water problems. Only about one percent of the operators indicated that they had any intentions of upgrading or concern about final use of their particular site.

The solid waste disposal standards and regulations that we've developed became law in the spring of 1970. They were written as a base standard for handling all wastes. By this, I mean other standards can be branched off from the base standard, such as we now have regarding feedlot waste and also auto hulks.

Legislation that was passed in the '69 session charged us to adopt standards recognizing that no one standard is applicable to the entire State. This meant taking into consideration population densities, existing physical conditions, topography, soils, transportation, and land use. We were encouraged to develop and expand existing solid waste disposal programs and provide three basic things: planning, technical aid, and enforcement assistance.

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*Director, Solid Waste Division, Minnesota Pollution Control Agency, Minneapolis, Minnesota

In view of this legislative charge, I felt I had to surround myself with a staff of chemical engineers, geologists, agricultural engineers, and some clerical staff. Just recently the Attorney General has seen fit to appoint an attorney to my staff.

Knowing very well, with a small staff, 835 municipalities, and about 900 dumps in the State, I had to look at a different branch of government than the local government to give the responsibility to. This was the county level. In the State we have 87 counties, of which seven constitute our metro Twin City area and approximately 50 percent of the State's population. We felt a county-wide system plan was the direction to pursue.

The complexities and many variables involved suggested a need for regional approaches as a way to come to grips with the solid waste problems and lead to long-lasting solutions that are both effective and satisfactory to the region at large. By requiring a systematic approach in achieving the objective of a regional solid waste plan, we feel that any one segment in this management system is less likely to be omitted.

In making a system analysis of a county, the functions of solid waste handling, storage, collection, transportation, the recycling or intermediate volume reduction methods and ultimate disposal must be considered if the integrated operation is to be comprehensive. We felt no independent operation could function.

The area to be included in a comprehensive solid waste management system must encompass the largest feasible geographical area of present and predicted solid waste generation and include disposal sites for at least 20 years.

Traditional political boundaries should not be the determining factor. We felt that multi-county cooperation in this regard could promote uniform enforcement throughout the area and that it would be much easier to obtain State or Federal assistance, if and when it ever became available.

To develop an areawide program, county government officials must meet with cities within the county and neighboring jurisdictions to identify similar problems which can be solved jointly.

The advantage of areawide comprehensive cooperative activity is to: (1) eliminate duplication of initial surveys; (2) have greater flexibility in locating disposal sites; (3) more easily obtain support from local news media; (4) arrange greater discounts for volume orders of collection and disposal equipment; (5) secure coordination of air and water pollution abatement activities; and (7) achieve a better chance for assistance and economics of scale in such things as administrative costs, land acquisitions, and construction costs.

A preliminary plan for the solid waste management system, which was submitted in July 1971, consisted of a policy statement indicating the progress and direction of the study and a preliminary brief about existing solid waste practices, conditions, and facilities. The final solid waste management system was due on July 1st, 1972 and was to have been adopted by the Board of Commissioners of the county or counties it related to.

Other legislation that was enacted, relating to solid waste management planning, was that of the Metropolitan Council. It was to adopt a long-range plan identifying the ultimate disposal as landfill in the seven county area and the acre feet needed for the next 15 to 20 years. The county level of government was to be the operating agent, the Metropolitan Council the planning agency, and the State the regulatory agency.

This has been accomplished and a reduction of 70 open dumps transition to 15 licensed landfills now exist in this area. And well over the majority of those are private operations.

We also developed a State plan stipulating that solid waste management systems must be developed on a regional level with ultimate disposal in landfills. The plan has been accepted by the Governor and Mr. Ruckelshaus, and 85 percent of the counties have submitted final workable plans or signed an agreement to submit a plan by the summer of 1973.

The 1971 legislation session passed a County Permissive Act under which county governments could levy up to 3 mills to subsidize and develop a countywide system. One chapter in that permissive bill made it mandatory that each county cooperate with our agency to set up an inspection and a policing program within its jurisdiction.

Through the efforts of a requirement to receive subsidy from our auto hulk program and also the provision of this county act, we now have what we call 87 "Hit Men". Every "Hit Man" is in the county and he may be the zoning administrator, a county commissioner, an engineer, but someone designated by each board to be responsible for solid waste management for that county.

Also, a part of the solid waste management plan, a program to abolish the existing system and close all non-conforming sites if they didn't meet the state requirements along with a compliance schedule.

Communications and public education is an absolute must to enable any such system to become a reality. Coordinating planning, permits, and a close liaison with both the water and air quality divisions of our agency in the Environmental Health Division of the State Health Department were our first steps in communications.

Also, all staff members of the division are sent to all suggested Federal Environmental Protection Agency courses and with the assistance of their staff, regional schools have been and are being held in Minnesota. Invitations to were sent the public but more specifically to operators, consultants, public officials, auditors and county "hit men". We are just completing a series of four regional meetings in Minnesota today at which an average of 50 to 75 have attended.

I'd just like to comment on a three-day case study of our State program by the EPA and who we contacted and what some of the results were.

The team consisting of financial, intergovernmental, basic data and regulatory backgrounds came to see us in Minnesota to review our program. We first met with the environmental liaison staff member of the governor's office. Next we met with the Metro-Council officials relating to regional solid waste management systems. The Attorney General's office and staff members of the legislative committees concerned with the environment were next. Also, an environmental financing unit of the budget division discussed the program with the team along with the director of the State planning agency and the office of local government affairs.

One of the largest haulers in the area discussed his operation, how it related to the program, and visited one of the local landfills discussing his operation with the owner himself.

The reason for the survey was to identify the liaison with the State program through all levels of government, regulatory agencies and private industry and get an indication from them on how the program relates and if they are aware of the program and how it relates to the community and their responsibility and just what exactly landfills are and how they relate to the program.

I'm happy to report that each of the above knows what a landfill is and what a solid waste management system is and we are continuing through various civic groups, professional organizations, conferences, symposiums, and discussions with public and private officials to explain these practices. We also have films available and our staff for local use relating to the League of Women Voters and the League of Municipalities because we attend their meetings and we feel these are a must.

One last work in regard to communication and public education is legislative lobbying. I know some of you people maybe can't do this on a State level but I feel it's of utmost importance in relationship of the role of the State in landfill proposal programs. I feel writing or assisting in writing a State act, local ordinances are an absolute must. At the present time I'm writing new legislation relating to hazardous material, licensing of landfill operators, and permit fees. I feel if I believe in these proposals, I must sit with the senator or with the representative who's going to carry the bills so he can completely understand the comments and also testify in their behalf.

One thing, and I've been associated with this since '68, I feel that politics, communications, and public education are necessary tools to ensure that regulatory agencies such as I'm associated with get into the regulations the proper and reasonable tools for land disposal.

Coordinating with the assisting local government and private industry in establishing landfill programs basically relate to support. First of all we must be sure that they have and know what the State or local regulations contain. Discussing this with Bill Harrington and other private consultants, one of the most important phases of a program or system is getting together all the people who are going to be involved in the development of a program. In the primary or preliminary stages, this involves them in a field survey and preliminary plan review; support at hearings will assist in approval of any good plan. This can save embarrassment, can save money and time, properly protect the environment and do what's right for the community.

We are finding out that if you are reasonable and assist in the development of a good sound system plan, it will become a reality. Local government needs assistance and local ordinances to run a good landfill. We've developed in Minnesota model ordinances and many are using them. Let the local people tell you how they want to develop their system and suggest some alternatives if they are pursuing the wrong direction. Many of them have never heard of a performance bond. I feel with good, sound protections, with reasonableness and variances where necessary, as we've discussed today with relation to cover material and other aspects in the flood plan, the system will work.

We feel in Minnesota we've had a few breaks but I believe some of us have to make them. I'd like to just indicate to you that we have developed a solid waste management manual which was supplied at these regional meetings to local officials, county, operators and so on, identifying our solid waste program, the landfill concept and how air quality relates to the program. It also contains dump closing procedures and all the regulations that involve the local community. In the development of a solid waste system, we have a 16-page document of one of our counties which identifies the total concept of collection, transportation and ultimate disposal. It's a feasible operation and it's functioning. Lastly, yesterday we just saw the list, the six-county operation in the Duluth-Superior area developed by a consultant, which relates to not only the two landfill concepts but also we identify a Class 2 and 3 which is relinquishing let's say a little bit of the landfill principles on daily cover.

But the program which will be implemented, let's say, within the next year constitutes the reduction of 176 open dumps to 35 sophisticated land disposal systems.

QUESTION AND ANSWER SESSION

Don McClenahan: Mr. Forsberg mentioned that in developing his staff he considered the use of and the need for engineers and hydrogeologists and geologists and so on, and I'm wondering if he considered adding to his staff an experienced sanitary landfill operator?

Floyd Forsberg: I think it's a feasible step to pursue, if you can get a landfill operator to join a staff for the kind of money the State is going to pay him.

Samuel Johnson: Instead of working with politicians, we found it was much better to turn a program over to the LRC and let them push it. The last thing I want to do as a State director is get involved with a bunch of politicians. This mistake was made a couple of years ago in one of our other programs, and the politicians know who the man is now to contact and they contact him constantly. He has every politician in the State on his back.

Floyd Forsberg: Maybe he's had some bad experiences. But I feel our program, our accelerated program, is due to the association we've had with the State legislature. Without that education on that particular level I don't think we would have ever got it. We've also had tremendous support from the Haulers Association, which has actually lobbyed with us along with municipalities.

Kenneth Lustig: In answer to your question, the Department of Environmental Protection and Health in the State of Idaho has a fulltime landfill operator who travels around to all our landfills and works with the operators, goes through a training program. He used to run the landfills. He's on our staff fulltime.

Floyd Forsberg: The regional schools we have, our staff doesn't put on the entire program. We have landfill operators make their presentations. The county officials, the people who are in the business, they make the presentations to the groups, so they're involved with our program.

Kenneth Lustig: We found the best way is to send the operator to the fill to work with the operator there, because if you bring them to a central location the guy says, "That's nice but that's not my operation."

Floyd Forsberg: You mean an actual demonstration?

Kenneth Lustig: Yes, we send our man there to actually work on his fills.

OBJECTIVES OF EPA MODEL SANITARY LANDFILL DEMONSTRATIONS

Jack DeMarco*

I am sure that most everyone here will support the viewpoint that sanitary landfills can be good neighbors. Yet, as has already been pointed out, there still is a great deal of adverse public reaction to initiating them in communities across the Nation.

One reason is the black box syndrome that always catches hold of many new-found environmentalists. The increasing call for resource recovery in lieu of sanitary landfill facilities is not unusual to many of us. However, the reality of resource recovery must be kept in its true perspective. We support the move toward resource recovery, but today's problems must be met with today's technology. In my opinion, resource recovery cannot currently be classified as today's technology in enough real life situations to conscientiously put an end to technology, such as sanitary landfills.

But we cannot lay the blame entirely on the uninformed viewpoint that resource recovery is here as a panacea for all of our solid waste problems. Allowing the poor land disposal operations to become the image that the public associates with all public, as well as private, operations hasn't helped us any. The public still doesn't believe that an outstanding job can be done in land disposing of solid wastes. Floyd's statistics on the miserable state of implementation of known technology are too common.

Challenge yourself to think of how many really outstanding sanitary landfills that you have seen. Are most of the land disposal sites that you have seen well operated? Was there an efficient management information system so that the true costs of the facility could be established? Was the operation on a self-financing basis? Could you take environmentalist groups to it without notice? Unfortunately, I think that most of the answers to these questions will be negative.

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*Deputy Director, Processing and Disposal Division, Office of Solid Waste Management Programs, U. S. Environmental Protection Agency (at time of presentation)

I wish I could say that we have all the solutions in our model sanitary landfill demonstration projects, but unfortunately, we do not. However, what I hope we have is the start of a messenger system that can show people what they can expect and should demand in their community instead of their proverbial town dump! On the selfish side, we hope to see some full-scale operations started and continued correctly so that data collected from them can be used to allay fears that "time bombs" are being built that will cause irreversible damage.

It always seems to be in order to describe what the Demonstration Grant Projects are not. Very briefly, they are not construction grant projects designed to put up as many facilities as can be accomplished with a massive dose of Federal dollars and some token amounts of local funds.

If you have questions about my discussion of the objectives of our Model Sanitary Landfill Demonstrations after I'm finished, I hope it will not be relative to whether they are construction grants or not, or even whether they are trial cases for a future construction grant program. The answer on both counts is no! So what then are we up to with our Model Sanitary Landfill Demonstration Projects?

Let me first give you a thumbnail sketch of a drastic change we have taken in this program. Most simply stated, where we once placed emphasis on totally new and innovative systems when awarding grants, we have now shifted our accent toward maximizing the current tools that, unfortunately, are not being used nearly as widespread as they should be. Thus, the objectives of our model sanitary landfill program are to demonstrate:

1. That in different geographical areas of the Nation that a sanitary landfill, in the true sense of the word, can be

an environmentally acceptable procedure that enhances rather than degrades the area used.

2. Communities and regions that are willing to make up their minds to initiate a sanitary landfill program can close down and will close down any non-acceptable operations in the vicinity. This is the practical act of providing an environmentally acceptable solid waste management facility and then enforcing the use of that facility or one that operates by the same high standards.

3. How to use sound financing mechanisms and efficient management techniques at sanitary landfills.

We expect a number of things from these model sanitary landfill grants, above and beyond a visual show-and-tell type facility that is there only because Uncle Buck has put up some money. As I stated before, it is not our purpose to initiate a sub rosa construction grant program. We have limited the Federal dollar values to $250,000 per grant and, in all cases, final awards were well below that amount. We have projects located at Ventura, California, Clark County, Arkansas, and Warren County, Pennsylvania; they will all be starting around January 1973.

We wish to demonstrate how with seed money a sanitary landfill program can sprout and grow into a continuous model operation that is a favorable asset to its location.

We expect that the projects will be self-financing and that the full cost of the system will be kept account of and distributed equitably back to the users of the system. Thus, the mechanism to charge the full cost, including capital costs, to the users of the system is an item that must be initiated at the start of operations. The mechanism must also include a flexibility for making changes when they are necessary. The amount of Federal money must be counted in as a cost to the operation and fee assessments must be made accordingly.

We require a cessation of open burning at disposal sites within the applicant's jurisdiction within 15 calendar days of grant award. Along with this stringent requirement, we require a schedule for the elimination of open dumps that coincides with the availability of acceptable disposal facilities.

We expect that enforcement of applicable solid waste management rules, regulations, and standards by the appropriate authority will be an integral part of our Model Sanitary Landfill demonstrations. Thus, we require a commitment from the State authority that it will enforce its rules and regulations in the applicant's jurisdiction.

We further require that the grantee provide legally established standards or rules and regulations that comply with OSWMP recommended guidelines and practices and that they be applicable throughout the grantee's jurisdiction.

We expect the project to be consistent with the State solid waste management planning effort and be based on an acceptable local or regional solid waste management plan for the applicant's jurisdiction.

We also require that our applicants have or be able to get legal authority to fully implement a solid waste management system, including the ability to operate, enforce, finance, or perform other necessary actions.

On each of the Model Sanitary Landfill demonstration projects, our financial support has been limited to capital expenditures, overall management and documentation of the techniques used, design, data collection, developing public relations materials, and training of personnel at the facility. We have attempted to refrain from granting money for personnel who are a normal part of the operation on an everyday basis. Basically, we are trying to minimize any dependency on Federal monies.

I might add that in addition to providing a model sanitary landfill operation for particular locations, there are other objectives to each of the grants awarded to date.

One project, for instance, will provide an accounting/ management information system that will be used throughout the regional area. The system will be developed with the concept of widespread applicability so that others might tailor it slightly for their specific part of the country. A user manual for the system will also be developed.

All of our grantees will document the process they used to arrive at equitable user fees so that others may benefit from the experience gained at their model operation. Documentation of actions, such as special handling techniques used in the disposal of hazardous wastes on one hand to the very different documentation of the intricacies of how operational regional systems were formed, is also an output.

Very frankly, we don't want to show what a community can do that is trying to cut every corner it can to provide the most economic practice regardless of the environmental consequences. We are trying to reach that Utopia that operations research analysts call optimization of the costs with the benefits to be derived. As an engineer, hopefully living in the world of reality, I know we will never fully optimize our environmental/economic factors. But I assure you that we in the Environmental Protection Agency will push for environmental quality and maintain a rational perspective while doing so. It has been personally rewarding to be able to exchange viewpoints with such a diverse group. I don't believe that the mix of participants could have been better selected.

DEVELOPING REGIONAL LAND DISPOSAL PROGRAMS

Don Berman*

We have heard the philosophy expounded that our only salvation, at least with regard to the solid wastes problem, is to recycle. We have been advised that unless we put paper back as paper, cans back as cans, and bottles back as bottles, we will soon drown in our own waste.

We are currently entering into a time period when we are beginning to realize that in a country as big as ours and in a society as diverse as ours, that there are many separate, distinct, and often completely opposing public, private, governmental, and environmental interests involved in solving environmental problems.

In the case of Allegheny County, some of the basic data around which our solid waste program was built includes the fact that in the 730-square-mile county, over 1,600,000 people are governed by 129 separate municipal bodies, each of which has in the past operated its own solid waste system.

In addition, while county officials have been wrestling with the development of a regional solid waste program for almost four decades, it has only been within the past few years that a public hue and cry about the need for such a system has been raised. This lack of popular support has spelled defeat for all previous attempts to implement a workable program.

In order to take the first step, it was essential that an easily implementable, relatively low-cost program be initiated. In 1968 the Commissioners of Allegheny County appointed a citizen's Solid Waste Advisory Committee. Its members included representatives of universities, local government, refuse collectors and citizen's groups. County personnel acted as their staff.

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*Director, Department of Waste Systems Management, Allegheny County Regulatory Authority, Pittsburgh, Pennsylvania

In April 1969, the committee presented its report to the Board and to a gathering of all the representatives of all 129 municipalities in the county.

Among the factors considered in the development of the report were the present practices and future needs of all municipalities in the county and the interests of local municipal governments, which had previously deterred the adoption of a countywide plan.

The report was approved by the Board and readily accepted by those in attendance. This action, coupled with the recently voiced concern over rising costs, led to the subsequent development of a specific program for solid waste management in Allegheny County. The report was general in nature and gave no specifics for a program. In essence, it said, "Let's get going." Between theory and science, on the one hand, and hard economics and municipal interests on the other, we believe we have developed a practical solid waste management plan. It includes the following general points:

1. Storage and collection are to remain the responsibility of individual local municipal governments.

2. Transportation shall be a combined municipal/county effort.

3. Final disposal is to be the responsibility of the county.

The specifics of the plan include: The establishment of 10 collection districts, the use of existing privately owned landfills to serve six of these districts, the construction by the county of transfer stations to service the seventh, eighth, and ninth districts, the purchase of an existing transfer station to serve the tenth district, and the purchase by the county of land reserves in those districts served only by the privately owned landfills.

Members of the original Solid Waste Advisory Committee have continued to lend their assistance in the implementation of the plan. A question and answer booklet was printed and distributed and a slide show was prepared. Meetings were held with elected officials in every area of the county. A few speaking requests were received and they were promptly honored.

I must point out that our plan, which for the present utilizes only sanitary landfills and transfer stations and which has been relatively well accepted, may be quite unacceptable in other areas of the country.

This element of acceptability gives rise to the first "don't" principle which I believe should be used in gaining public acceptance of any regional solid waste management plan recommending the use of landfills. "Don't propose landfilling for disposal purposes only."

Once this basic premise was reached, the premise that sanitary landfills and transfer stations were to be integral parts of our program, the next element to be investigated was where the fills and the transfer stations were to be located.

Here again, we could have used the latest sophisticated computer equipment and developed an ultra-modern model to end all models. The end result of that type of approach would have been the selection of specific sites which, in theory, would have given us the best possible solution and the one which would probably have led to the least possible dollar cost. This train of thought leads to the second "don't" principle which we utilized. "Don't try to find the single best theoretical answer."

In the county, this principle is evidenced by the fact that we have incorporated as an integral part of the plan, all of the privately owned landfills which can receive operating permits from the Pennsylvania Department of Environmental Resources and the County Health Department. We have included these landfills regardless of their location within the county. In fact, the six landfill districts were established around existing landfills and one of the transfer districts was established around the existing transfer station.

Our approach, in essence, is that where there are properly permitted solid waste facilities in existence, use them. Where there are none in close proximity to a given municipality or group of municipalities, build transfer stations to help decrease the total cost of the solid waste management program and use the existing landfills as the disposal sites.

The third element of our program involves the unknowns of future efforts in the total solid waste field. Our "don't" principle here acknowledges the fact that we are not omniscient. "Don't establish a plan that is completely inflexible."

To accommodate this philosophy, we are planning on purchasing land reserves for future use as sanitary landfills or for some other facility or type of operation as that particular operation may prove to be feasible, both technically and financially. We will not look for such sites in other than stripped areas.

We are presently in the process of finding sites for both the transfer stations and the land reserves. I believe that part of our favorable reception has been based on the fact that part of our favorable reception has been based on the fact that we have developed a method of proceeding which did not promise pie in the sky but was one which could be discussed in a relatively rational manner.

The first step in our hunt for sites involved meeting with a site selection committee composed of local elected officials and responsible people in the community, as selected by those officials, to ask them for assistance in the site selection process. For that specific purpose we developed a procedure which includes the following elements:

1. The establishment of site criteria by the county;
2. Designation of specific areas by the local site selection committee, using the site criteria developed by the county;
3. Evaluation by the county of the sites so designated;

4. A review of this evaluation by the site selection committee;

5. Pre-final selection of more than one site made jointly by the county and the site selection committee.

(I might add, that in all of these steps pertinent information was given by the site selection committee to local newspapers for publication.)

After the pre-final selection we went to the public and made a complete disclosure of all the information which we had developed. We attended regularly scheduled public meetings with responsible environmental groups or special meetings called by local officials in their particular municipalities.

We met with independent collectors and went to any number of closed meetings with small groups of interested citizens, normally those people who lived in the immediate area of the proposed facility. We succeeded, however, in avoiding public hearings called by irate environmentalists simply to lash out at our efforts.

We found that visual aids were appropriate for use at these meetings and developed two basic pieces of data for that purpose. The first was a map of the area showing the general location of proposed sites and the second was our evaluation chart which included the elements of road access, road restrictions, land ownership, utilities, zoning, estimated cost, nearness to homes, topography, size, relation to centroid, future plans and traffic. We were not looking for a specific, numbered rating but rather for general trends leading to a selection of the type of site which would fit our purpose.

As a result of all these steps, and because we had acted responsibly with local officials and with the environmental groups, we were able to make a final selection for the first transfer station site to be built by the county. This kind of an approach will be used in setting other transfer station sites and land reserves. The only difference will be that the evaluation for land reserves will also include the elements of size and life expectancy, reclamation and restoration, geology, and the availability of suitable cover material.

Once the site has been established and the facility built, and we are under construction now with the first transfer station, the one prime element which I believe will be essential in the continuing success of our program is the use of the facility as a tour area for educational purposes. This does two things: (1) It brings the actual operation into public view, thus allowing the citizen to see what he is responsible for; (2) just as important, it keeps the operator on his toes.

We have also attempted to establish a credibility rating with the public by giving newspaper interviews, appearing on radio and television programs, and in general, spending as much time talking to interested groups as we possibly can. I must admit, however, that solid waste on the local level cannot compete with the late movie or the F.B.I. or Archie Bunker. In fact, my first two appearances were on a local T.V. program at 2 a.m. live and 8:30 Sunday night on radio.

The one question I will answer before it is asked is, "How successful have you been?"

If you were to measure the progress made over the year and a half that we have been in existence, you would say that the selection of the site for only one transfer station and the start of construction leave much to be desired. However, if you take into account the 36 years of futility, the multitude of local governments, the political ramifications resulting from the local governmental hodgepodge, and the recently awakened ecological movement, I believe we have at least gotten an extremely strong foothold.

The motto of our department is, "Don't be discouraged." We will implement a solid waste management system, slowly but inexorably.

QUESTION AND ANSWER SESSION

Howard Christensen: We're embarked on a similar type program, and I'm interested in what type cooperation you got from elected officials as far as their making a site selection within their particular jurisdiction.

Don Berman: I was amazed, quite frankly, at their cooperation. In fact, in this one area they came to us and said, "Please help us. We've got a problem." Now that doesn't mean we're going to get that kind of cooperation from everybody. In fact, we were kicked out of one area because the local officials would not back us up. We're going back into that area because I know now that their planning group is going to recommend that they join the county system. This is why it's going slowly but inexorably--we are getting cooperation from local officials. It's like pulling teeth, but we're getting it.

Don McClenahan: You spoke about acquiring an existing transfer station. Is that by eminent domain or--

Don Berman: No. We hope to purchase it at a reasonably fair price. I think in our report we said something like $200,000 but the owner says a million. So somewhere in there. This happens to be a transfer station that's built on Pittsburgh-owned property. The contract is up next year. It may be renewed. But there are many things working towards the county getting into only the management phase.

One comment I want to stay out of the garbage business. I don't think government has any place in the business. All of my work will be put out on contract except for the first transfer station which I promised I would run just to prove to the people it can be done right. By the way, I shouldn't say this, but it's in a park.

THE MARC LANDFILL PROJECT

Michael Lawlor*

I'd like to start by reading to you an answer John T. Connor, former Secretary of Commerce under Lyndon Johnson and presently the Chairman and Chief Executive Officer of Allied Chemical, gave to an interviewer from Nation's Business.

He was asked, "What lessons have you learned from your career in both business and government?"

His answer was as follows: "For one, that it is essential for the good of the country that they work more closely together. I don't think we can accomplish our national objectives or meet our national goals without this kind of cooperation and understanding. It is very difficult to bring this about. In our system, for political reasons, business and government are often political adversaries. But I think men of good will on both sides will have to work toward a closer partnership. Otherwise, our system just isn't going to work."

It's a genuine pleasure for me to talk with you today about what can be accomplished when the public and private sectors of society join forces in the solid waste industry. There's probably no better example of that than right here where the country's best sanitary landfill project is in full and successful swing. Let me say right here that Browning-Ferris Industries, as the contractor, is delighted to be a part of that project.

Briefly, I might give you a bit of history behind the landfill project. The Mid-America Regional Council had studied the possibility of a model demonstration sanitary landfill for some time before bids were sought for the operation in the latter part of 1971. We bid on the project successfully in the name of our subsidiary, International Disposal Corporation. As you probably know, much of the funding has come from the Environmental Protection Agency on a demonstration grant.

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*Vice President of Landfill Operations, Browning-Ferris Industries, Houston, Texas

The remainder of the funding has come from the counties and townships which make up the Mid-America Regional Council and from the disposal fees received from users of the landfill.

We started operating the landfill on February 14, 1972. Some of the initial work on the site preparation had been done before we began operations with a minimum of tonnage. We're now handling about 750 tons a day, with some days approaching 1,000 tonnage. This is half again as much as previous estimates had indicated. At that rate, and we certainly see no let up, the landfill will be completed in another year and a half or so. This is far earlier than had been anticipated.

That leads me to the area that I consider to be one of the major factors in making the demonstration project a success. Call it what you will, public relations or education, but making the public aware of exactly what the landfill is--particularly that it is being operated in the best possible manner--has largely been responsible for its success. In fact, part of our contract is the idea that B.F.I. is ready and willing to assist in the public relations area. I suppose Jerry Stapely, who most of you will meet tomorrow and who manages our fill, has attended as many meetings as anyone with the various townships, counties, and at EPA-sponsored schools, all designed to explain just what we're doing out there in what used to be known as Rattlebone Hollow.

Has that effort paid off? Let me give you one example. Several weeks ago, we went out to the site about 6:30 one evening. On one area that's already been finished there were about 20 youngsters playing football. It wasn't too good for the grass, since the area had just been seeded but it sure did warm our hearts. There's no question that those 20 kids had really accepted the landfill project with a passion.

But can the public and private sectors team up successfully in other areas? We certainly think so. We believe we can use the MARC project as a vehicle to join with many other cities or areas in a public-private partnership. I think the cities will find that we, as the private partner, can do some things much better because we have flexibility. We can bring in additional manpower if we need it, we can get additional equipment if we need it. This flexibility is not always available to the cities immediately or to regional groups such as MARC. We can join with them in the search for new sanitary landfill sites which are best suited for their particular needs. We can even buy the real estate if there is a funding problem.

This cooperative effort will work, and it will work even in the absence of massive Federal financial aid. Take Houston, for example. We buy the land and we run a sanitary landfill operation for the city. We do it for pretty much the same price as we do here in Kansas City, and we also try to operate it as a model sanitary landfill. Houston, by the way, is of a much larger scale in terms of tonnage and volume, thus accounting for the pricing similarity despite our additional land cost.

Such a partnership, we feel, is both practical and economical, even for a medium-size town or community. If a city has between five and six hundred tons of solid waste per day, we can come in and operate a model sanitary landfill operation at a reasonable cost, comparable to what we have in Kansas City. In Kansas City, of course, we don't have a real estate cost, which saves some money as far as Browning-Ferris is concerned. What I'm saying is that you don't need the regional concept if the volume and tonnage are there.

A fair-size city can handle a model project. I'm certainly not belittling the regional concept because we think it is an ideal approach where volume and tonnage are distributed over a wide area in many townships or counties.

When I say working relationship, I mean just that. It's been a pleasure to work with the Mid-America Regional Council because: (1) they are easy to work with; (2) they have flexibility; (3) they have a set of standards which we understand and comply with. At first glance, the standards seemed tough and nearly impossible. But when we sat down and studied them and started putting them into practice we found that they were more than just good standards, they were excellent. We have, in fact, used their standards and a copy of our contract to work out other agreements with private individuals and proposed these to other cities, saying we'd be happy to bid on such specifications. Even if we lose bids on such specifications, we feel whoever gets the contract, as long as they live up to the specificaitons will have to do a good job.

As for the day-to-day relationship between B.F.I. and MARC, let me give you an example of what I mean by flexibility. A few weeks ago we got a task force from B.F.I. that went on a week-long tour of many of our sanitary landfill operations. We wanted Jerry Stapley to go with us on this tour. Gerald Neeley and Nick Artz quickly agreed. There was none of this "O.K., you guys got the contract so Jerry's going to stay here at the site." He soes it because he wants to.

We have a difference of opinion with MARC occasionally, but they're usually minor. For example, in the beginning, we felt that compactors would have given us a little more density than bulldozers. But the specifications called for bulldozers, and they're doing a good job. Some differences are inevitable, but in the long run they probably contribute to a better operation. We at B.F.I. simply do not know of a better operation.

Using 20-20 hindsight, we can see only one major change we would recommend. The site should have been larger so it would have lasted longer. But I'm not sure anyone could have anticipated what has happened. Based on 600 tons a day, this landfill would have lasted three and a half years. Nobody could foresee that Kansas City, Missouri, would shut down several of its dumps to come across the river into Kansas City, Kansas, with its waste. But that happened, and we certainly are not complaining; neither is the EPA. Shutting down the dumps is a nice shot in the arm for EPA's Mission 5,000--a program designed to close down all the dumps in this country.

In essence, what happened is part and parcel of a model sanitary landfill operation. We had an operation that clearly disputed any alternative available in the Mid-America region--in this case open dumps, a poor alternative at best. So the region gets a park a year and a half earlier than had been anticipated. What I'm saying is, the end result of shorter life expectancy for the site is fine. We just should have anticipated it in our earlier planning.

What happened here has convinced us that you can anticipate a similar occurrence anywhere that a model landfill is a clear alternative to open dumps. We feel that under a similar set of circumstances that any city or any region could expect to close its dumps down within six months or a year after opening a model sanitary landfill. Public pressure, if nothing else, would compel closing the dumps with a top flight landfill operation as an alternative.

There is a parallel here with the project that I was associated with in Washington, D. C. In fact, that project was the first truly model sanitary landfill and the MARC project, the first regional model landfill, is based on the requirements by HEW for Kenilworth. For 30 years there had been an open burning dump off Kenilworth Avenue, just three miles from the Capitol Building. It wasn't until there was a tragedy there that public pressure mounted to do something about the dump. So HEW laid out the specifications for the first model sanitary landfill.

Well, just like Fannie Brice once said, she had been rich and she had been poor, "Believe me, rich is better." Let me say that starting a model landfill from scratch is much better than trying to convert a 30-year-old burning dump into one. Kenilworth was just about 30 times harder than Rattlebone Hollow. If any one of you has ever been involved with a burning dump you may recall that there's a lot more to putting out fire than just squirting water on it. At Kenilworth we had to dig down as deep as 35 feet to bring the fires to the surface where they could be put out. Then we had to put it all back in the ground and compact it. So believe me, starting with a virgin site is better.

There's another parallel between Kansas City and Washington. If you have public support for landfill operations--I'm told just last month or so Mayor Wheeler had a picnic out on the landfill site and that press coverage for that event helped pass an 8.4 million dollar bond election. That was done once in Washington, too, and it also helped generate public support. It really does work. People get to see on their television screens that a good sanitary landfill operation looks good and, as a result, their fears are removed and they support it.

That brings me to a final point regarding cooperation between the public and private sector, that partnership we have been talking about.

We have learned that we at B.F.I. can work with the public sector on a good contract and still run a model operation while making a profit. We can run a good operation that they will be proud of and we can do it without undue friction. It is as important for us, the private sector, to make the public sector look good in their decisions as it is for them to work with us. But, then, that is just exactly what a partnership is all about.

QUESTION AND ANSWER SESSION

Samuel Johnson: From all the sounds that have come from the panel up there it sounds like the private sector is the virgin in this thing. The private sector, traditionally in this country, has taken the cream and left the skim milk to the public. There are areas where the private sector can do a better job than possibly the public can do, but there are areas where their record is horrendously poor.

They have taken the cities and the contracts in the cities and left the doughnuts surrounding the city that are unincorporated, primarily unhandled. And if they did take the doughnuts, they left the county, the rural unhandled.

William McNulty: I've talked in a few places, primarily back home in Connecticut. Where I come from, we've got a lot of rotten messes. And the rotten messes are all operated by the politicians and the protection of these politicians is like Parkinson's Law, it just spreads out to the time allotted.

So I've heard all I want to hear from anybody from the public sector talking about the private sector. It takes somebody who's real good and sharp in the private sector to get this thing moving. I've seen more dumps since I've been a kid this big operated by cities, towns and villages and it takes somebody like some of the people we're involved with to get them to work.

Don Berman: Can I make one comment? This was something that I wasn't there as a first party but I heard. It was in court. An elderly landfill operator in Allegheny County was hauled into court by the DER Pennsylvania Department of Environmental Resources, and the County Health Department. And he had been operating a dump as he operated a dump for about 30 years. He finally got hauled into court after he'd been fined and chastised and was told he had to shape up or ship out.

He finally turned to the judge and he said, "Judge, how come for 30 years I've been doing it this way and all of a sudden I'm a ___ ___ _ _____?"

I think we've done a lot of things wrong in the past. I think the public sector, the private sector, all government levels from Uncle Sam on down, have got to realize that what we did before we did because we didn't really care what happened to the waste. Now we do care. It's going to have to be a cooperative effort on the part of industry, government, citizens, the elected officials, everybody, to straighten this whole mess out.

THE MILWAUKEE TRANSFER SYSTEM
LAND DISPOSAL PROGRAM

Harold Smith*

What I've been involved with in waste management I was selected to speak about the Milwaukee Transfer concept because I had the original management of that program for Waste Management, Inc.

When I sat in on the initial meeting, I heard an individual at the podium indicate that part of the program here is to develop a partnership and understanding between the private and the public sectors. I believe that to say that we will cooperate is one thing, but I would like to go into the Milwaukee Transfer program as it developed and as it is now functioning as an indication of the kind of partnership support we needed from the city.

The Milwaukee Transfer conversion in the Milwaukee incinerators developed because of the air pollution standard requirements set by the Federal government and the State which indicated to the City of Milwaukee they had to go in to a twenty-nine million dollar investment to build a new site and upgrade the two existing sites and to abandon one of them.

At the same time they were running out of landfill within the municipality and they had long had a kind of controversy which I think is probably prevalent in the land of the urban against the suburban. So in an attempt to satisfy the needs of the suburban people as well as the urban people, they developed a countywide program of disposal. They selected a contractor and established a rate. The mayor of the City of Milwaukee decided that not enough data had been gathered and had not been gathered properly by objective people, and withdrew from the program.

Now, in the City of Milwaukee there is a single journal company newspaper that bought out the Milwaukee Sentinel so that the public organ that goes to Mr. and Mrs. Jones' house every night comes from the same editor's desk. He also had a few problems with the mayor and the mayor, in turn, with the Journal.

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*General Manager, Waste Management, Inc., Oak Brook, Illinois

So the mayor prevailed and suggested they hire an independent objective-viewing firm, Black & Veatch of Kansas City to run a study and develop specifications that would enable private enterprise to bid.

Black & Veatch pursued the matter, developed specifications and Waste Management, Inc. turned out to be the lowest bidder. But in the interim, the Journal selected Waste Management, Inc. as an adjunct to the mayor, and in an effort to attack him, the paper started attacking Waste Management, Inc.

This created a number of problems. Number one, councilmen who are elected by the electorate, by and large suscribers of the Journal, responded to this publicity and got on the bandwagon. This generated a lot of noise from City Hall with regard to our bid.

All we were interested in was the contract, doing the work, fulfilling the contract, and saving the city money. As it turned out, our bid would save the City of Milwaukee a million dollars a year. The council negotiated this thing back and forth and finally approved the contract on November 19, 1970.

We were to start on January 1st, 1971, and Wisconsin has snow and ice at that time of year. Also, they did not want us to interfere with the burning operation, as it was handling the city's quantity at the time. So we had to go in and store our packer equipment, separate walls, open up doorways, and make parking lots without interfering with the city's operation. We had this to do in 45 days. Luckily, we elected to use equipment manufactured in Milwaukee and because of the size and number of pieces of equipment, they were in bed with us at this time to get this contract in operation.

So as of November 19th, we had a clear shot. Forty-five days later we had to acquire an entire crew, convert that incinerator to our operation, and we had to do this from December 31st at 5 o'clock to January 4th at 7 o'clock, at no time interfering with the city.

Now, the Department of Public Works is headed by Mr. Herb Gash who, in fact, felt private enterprise could save the city money, and he could not compete with it. And he did give us support in spite of the Journal's continual harassment in attacking us and the mayor.

So we acquired our people through advertising and we had to go in with 31 men who had never worked together before in all their lives. But they had fulfilled certain functions, one of which was the driving of semi-tractors. It turned out that the type of transfer operation we were talking about provided those people an opportunity to be home every night. And after they had been over-the-road for some 15 years, they wanted to come home every night. So we attracted a goodly number of professional drivers, people who had more than 10 years driving experience over-the-road. But they had never in all their life been to a landfill and they had never emptied a garbage truck. And they heard about garbage truck drivers and they did not relate to it that at the time we hired them that they were, in fact, garbage truck drivers.

So we had to go to crane people to be trained as well, who could be professional on cranes, as it had been in operation some 16 years. Now the crane is wholly owned by the city, so the electrician adjusted each crane to the operator's desire. So we acquired the city crane men, which the Department of Public Works made available to us by giving those people a leave of absence. So we amassed our people. We did the conversion contracting with the support of Ohio Equipment. We had one orientation day with all the equipment people before we started the operation on the 28th day of December. We brought them all together and we said we're going to take this thing over. They were aware of the opposition. And we said, "We're going to climb Mount Everest." By golly, we did.

So they came in on January 4th with the newspapers now predicting that we could not fulfill the contract at a time when they had given up their regular jobs and they had families to feed, and that sort of thing. The Journal was running headlines saying that we wouldn't be able to handle this material and transfer, that we would fail within two weeks.

So these people came to work and the first day we opened the door, it just snowed six or seven inches, so the city pulled all the garbage trucks off and went out on snow plowing trucks. And this gave me one additional day to train these people.

On the second day we opened the door, came in and we decided we're going to move the stuff and don't panic, don't run, make normal motions, and if I end up on the floor with garbage up to my ears, that's normal. Don't panic.

So they came in and at the same time so did Channel 4, Channel 6, Channel 13, taking these peoples' picture with their cameras. You know these are not public speakers, these are not actors, these are drivers.

So we managed to get through the first day. But the city brought in 350 tons, which was 130 tons more than that particular station had ever seen in its lifetime before. With the city's cooperation, we were able to acquire the city crane men which we needed to load our packers. With the city's cooperation we were able to schedule city trucks to the door.

I think that that is an indication of the kind of support you're talking about, when you're talking about public and private enterprise combining for a single purpose. They had a need, we had a need, we offered a lower rate, and a savings of a million dollars a year to the city, and if they didn't have the backbone to stand up to various aldermen and councilmen and the Journal, the chances are good that we could not have fulfilled the contract we had taken.

And we, at Waste Management, are interested in going again into a city or town or municipality and working in a partnership type arrangement, but we do need more support than the written document we have on our table saying that you will provide 10 minutes, no more, no interference to the various cities.

Now, if we can get this cooperation from the public sector the privates, I speak of B.F.I. as well, are interested in providing service and saving money, if we can. Now we're not going to solve all the problems of the United States. We're profit oriented people and we think the cities are now becoming more profit oriented. If we can save you a buck, you use our service. If we can't, you do it yourself.

QUESTION AND ANSWER SESSION

R. E. Dorer: I'd like to ask the gentleman who talked about Allegheny County, do you run into zoning, use permits, and public hearings when you go to get these sites?

Don Berman: Yes, we do, which is one of the reasons we work with local elected officials. They know what their zoning is and they know what their use permit is, and they know what their restrictions are on the county moving in. You see, one of the problems we face in the county is that we can build a solid waste facility but we can't force anybody to use it. That's one of the quirks of the law, so I have to have their cooperation. That's why we work with them in getting the use permit.

Now, one of the items that I mentioned was zoning. If an area is zoned for single-family residences, I'd just as soon stay out of it unless the local people say to me this might not be a bad place to go. I'll make a selection but they give me the clue.

R. E. Dorer: Doesn't it have to go to public hearing, though? That's what I'm saying. If you change zoning or use permit it has to go to public hearing.

Don Berman: Yes.

R. E. Dorer: How successful are you at public hearings?

Don Berman: I've been successful, and I've been unsuccessful. I've had the skin ripped off my back, and I've had a little cooperation from the local officials. It depends on the particular area. That's why we go through all five or six steps, to try to get to the point at the public hearing where I know I'm going to have friends in the audience who will take my side. It's a give and take thing. That's why there's no single answer.

Cecil Iglehart: Mr. Smith, I'd like to direct this question to you. At six months after your operation, and you've proved yourself successful, did you ever get any good publicity in the newspaper?

Harold Smith: Actually, from the Journal we were never necessarily attacked directly as Waste Management, Inc. It was always a direct attack on the political entities, such as the mayor's office and their chosen contractor. At no point were they able to attack our operation. Our operational standards are as good as the city expected, in fact, twice as good. We're quite happy with it. And the Journal, the only kind of condescension the Journal gives you in regard to good publicity is to not mention your name.

Dotson Luton: About this private and public sector thing, generally the private people will have to be better businessmen. They have to be. They're out to make a living. They have to make a profit or they won't do it. The public doesn't have to have this incentive. On the other hand, some of our counties can't get private people to go in because it's too sparsely populated. They can't go in and make a living so the county has to do it. And they can do a good job. We don't have any real argument with, you know, who handles it.

Jerry Bond: I don't have a question necessarily, I'm just a very small operator in a very small place. A direct observation. This whole problem is big enough for all of us. I really don't see that we need to be bloodying one another's nose about it. I have a hunch it will keep us all busy to try to get it fixed.

PANEL D

NEW APPROACHES TO LAND DISPOSAL

MODERATOR: Eugene Wingerter*

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*Executive Director, National Solid Wastes Management Association

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LANDFILLING OF MILLED REFUSE

Dr. Robert Ham*

Synopsis

Dr. Ham prefaced his slide presentation by stating that he did not intend to discuss the milled refuse project he is conducting at Madison, Wisconsin, because the work had already been adequately reported on in various media. He then outlined several areas that he believed needed to be studied:

1. Developing guidelines and specifications to aid in operating and evaluating a milled refuse landfill;
2. Achieving a better understanding of decomposition processes with the objective of controlling the type and rate of decomposition in an optimal fashion for each site;
3. Relating the fineness of the grind, possibly by component, to the characteristics of the milled refuse in the landfill;
4. Gaining additional information on aged milled refuse in a landfill;
5. Obtaining documentation on successes and failures with relation to differing refuse compositions and climatic conditions.

In the balance of his presentation, Dr. Ham showed slides depicting equipment, procedures, topographies, and physical appearance of some of the 20 milled refuse sites he had visited in England, France, Scotland, and West Germany.

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*Associate Professor, University of Wisconsin

QUESTION AND ANSWER SESSION

John Ruf: I was interested in your comments on the fire in Germany. I was Project Officer of the Gainesville Composting Plant for a few years.

Near the end of the plant we by-passed the digesters and landfilled the material, so in effect we had a milled refuse disposal system. And we did have fires at Gainesville with the milled refuse for about a week. We also had leachate problems with the stored milled refuse. But the fires were in windrows and they were quite notorious and helped close the plant at Gainesville.

Francis Fyles: I believe this milled refuse--you still have to take under consideration the leachate and the underground water problem. If there's no cover, there's little chance of control of that. So this is the part that I think should be considered the most in looking at it, because does it produce leachate in quantity, are there other methods of control? Maybe it answers its own problems the way it behaves.

Robert Ham: I'd like to also react to John's comment. In a compost pile where you are purposely aerating, you certainly are not providing compaction and where you have a fairly steep incline, I completely agree, the stuff is going to burn. Our results are based on level, relatively compact fills. I think there is a big difference.

As far as the leachate question, we have done a lot of work on this leachate question and, as I said before, our data pretty well indicates that the leachate problem will be there, whether you cover or not. And the function of cover will be to regulate when leachate comes and the amount that you're going to get. But it will not mean that you will not necessarily have leachate.

This is a matter of engineering. If you are engineering a site so that the pulse of leachate is going to be a detriment to the site, then I would either not go to the milling route or I would cover it. I would have a very steep contour to make sure that I had maximum run-off. If, on the other hand, we're going to accept the same amount of leachate we would get accumulatively with the regular sanitary landfill, then I see no problem with milling refuse and not covering it. And we do have data to back this up.

Kenneth Lustig: Doctor Ham, have there been any comparative studies on the state of decomposition of waste in landfills, contemporary landfills, and milled waste? In other words, what is the state of decomposition in a landfill after 20 years as compared to milled waste?

Robert Ham: That's a very good question and this is the kind of documentation we're still trying to provide. Remember that the results that I'm quoting are really obtained at Madison and under fairly rigid conditions which will not necessarily simulate what you have elsewhere in the country with different refuse depths and so forth. And this makes a big difference.

Under Madison conditions and with four to six-foot deep cells, where we have unprocessed covered and milled uncovered, side by side, we're finding that the milled material will decompose more quickly and it will approach a more inert form with time much more quickly than will the unprocessed refuse.

As far as what would happen after 20 years and so forth, this is exactly why I felt we had to go to Europe, because we just don't have that kind of documentation here. I think that the European experience indicates that this material will decompose much more quickly.

There have been unprocessed refuse sites excavated not too far from some of the sites that we showed in the slides and I think there they found that they could still read newspapers and so forth. So I do think that with milling you do get more rapid decomposition and this will change the character of the refuse more quickly and certainly more uniformly. That much is for sure.

Angus MacPhee: Are you familiar with the Borg project in Oregon where the material was mixed into the soil? There is also one coming up in Western Montana, but that is the whole thrust of the thing, to put the milled refuse on some of the soils to break them up and retain water.

Robert Ham: The comment was that there are several places in the country that are now putting milled refuse on the land in fairly thin layers and either discing it in or not discing it into the soil, the idea being to incorporate it into the soil and increase the organic content.

My comment on that is, this is being done. We saw it. That's the reason I showed it in the slides. It is being done successfully in other parts of the world.

My feeling is that the long-term implications of milling are to do exactly that, to provide some method of recycling material back on the land or even more long term to provide and enhance its capability for recycling. I do not think that the milling project per se is that important as far as landfill is concerned, and maybe 30 years from now it's going to be more important from the recycling capability.

Donald Andres: I was going to ask the same question I asked Bob. The EPA has finally come out with some statements here, Bob, and they didn't have the data. They suggested I ask you this morning. That is, the maggots present on incoming solid wastes, it says here the milling process kills nearly a hundred percent. If I was reading a toothpaste ad I would suggest that probably is greater than 70 percent, but in an engineering point of view, how near are we to 100 percent? Are we up around 98, 99, 92, or what?

Robert Ham: I'm not competent in the entomology portion of the project, so this is part of the project we farmed out or subcontracted to entomologists who are in this part of the State.

I'll simply cite their conclusions. On two occasions they took maggots that they bred in the laboratories, put them in known quantity on refuse as it was going up the feed conveyor into the mill. Then they took the same material, put it in plastic bags and brought it into the lab where some poor guy, I suppose, had to sit there and count these darn things. And then they took fractions of it and subjected it to laboratory conditions where they knew that if there were viable maggots present they would breed and reproduce and they could count flies.

And their conclusions, which came out in writing under their name, was that in one case out of 5,000 maggots none survived, that they could find. And in another case, out of 10,000 maggots, approximately 80 survived. Their conclusion was that we have well over 99 percent mortality. These are the only studies of that kind that I know about. I'd sure be interested in further substantiation or nonsubstantiation of those figures, because I think they're very interesting.

Kenneth Goldbach: Most of the slides you've shown this morning seem to locate a mill facility in a remote area away from habitation. We have a county facing a possible suit before they get theirs built because of the noise associated with the mill. Have you considered the noise level, acceptable noise level, and how close can we put a mill to a residential area?

Robert Ham: I don't know if I'm the proper person to answer that. My part of the project has been more from the landfill standpoint. I think I can cite from Madison experience that the noise problems that they have had have come from the beeper that occurs, that happens when the frontend loader is put in reverse. The people have complained about the beeper.

The noise level inside the facility is there. There's no question about it. I think that this would be something that I would be concerned about if I was putting a mill very close to a residential facilities.

Now in Europe this is being done. I'm sorry if the slides seemed to indicate that the sites were remote. They shouldn't have indicated that, because I was rather amazed that practically every site was very close to people who were living there, or highways or something like that. I think this is one of the problems in Europe, that you don't have remote sites. If I had picked a few different slides you would have seen people filling literally on the back doors of houses and so forth.

William McNulty: First off, that's no more of a problem than running any kind of a crusher in a sand and gravel plant. They don't make any more noise. And the noise--it's because people don't want it there, period, no matter how much noise it makes.

Doctor, what I wanted to know is, I've seen them feeding these plants with a frontend loader. Obviously the guy's sorting out what he's putting in and there's maybe a fellow standing alongside the conveyor picking out other stuff that he doesn't want on it.

Now, I'd like to know, did any of the stuff you saw in Europe, were they dumping directly on an apron feeder so that nobody was playing games picking stuff out? In other words, dumping directly on a feeder and get rid of this extra labor.

Robert Ham: In most cases they would do that, unless the conveyor was filled. This was the desire, to dump it directly in the conveyor.

Don McClenahan: This matter of cover versus non-cover. Is there any trend in this country on the part of our State regulatory agencies to accept milled refuse in a commercial site without cover, excepting the final cover is highly desirable?

Robert Ham: I've been contacted by many of the States and I think that the common reaction that I see is one of interest and concern. They're interested because this may be a way out.

I don't think that milling will ever replace the sanitary landfill. It's more expensive. It is simply an alternative which may be particularly useful on certain sites, depending on climatic and soil conditions and so forth. Now when we look at it in that light, the regulatory people understand that for them to enforce regulations and so forth it may be difficult to do in certain sites, where cover dirt is not readily available and stuff like that.

Well, they're interested because in order to promote sound solid waste management, and this is what we're all about, this may be a very necessary alternative in certain sites. So I think that in some cases we are seeing specific exemptions and so forth being given with the idea being, true, we don't have all the facts, but we've got enough documentation. It's a fair bet it will go, so let's open it up and consider the thing almost experimentally, if you will.

John Ruf: In Gainesville, there were maggot studies and other vector studies. Through the shredder there was a tremendous die off of the maggots through the shredder. There was also a noise study. We had the most considerable noise problem with the end loaders not with the shredders.

These are unpublished reports on the composting plant at Gainesville and, also, a doctoral student did his work on the vectors at the composting plant. His thesis, I assume, can be obtained from the University of Florida.

Orville Stoddard: It seems to have real good application for household type refuse, apparently. This amounts to about 50 percent of the solid waste received at some sites. Have you had any experience with grinding other types of refuse, demolition debris, any other type of refuse?

Robert Ham: I think that's a matter of what you are proposing to do with the milling concept. There are mills that will grind virtually anything. I have watched a mill handle a piano. They just dropped the thing right in. And it's really a matter of powering the mill as such and designing as such that it will handle that kind of thing.

The biggest mill I know of in operation now is a 90 by 90 inch feed opening. Anything that will pass through that feed, they'll take it. The only things that you just plain can't put in any one of these things are hose, wire, that kind of thing. That's murder to any of them.

Ora Smith: We found that, in general, what happens when you start grinding over-sized bulky items, is that maintenance costs go up and down time goes up and shredder efficiency goes down.

Most things can be handled, but when you start dealing with wastes that are not residential in character you start having the possibility of getting in goodies like pressed gas cylinders that will have things in them like hydrogen maybe, spools of wire. A big spool of steel cable will do a good job on a grinder, but bulky wastes can be handled.

Walter Erlenbach: Are there qualitative comparisons of leachate between milled and normally compacted refuse? If so, what are the results?

Robert Ham: I've threatened to hold a whole week-long seminar in Madison on just the milling project, of which about four days would be devoted to leachate.

We've done a lot of work in that area. As far as written documentation, the only material we have out right now is in Public Works about one year ago, where there is a series of three articles. And you'll find in there some of our leachate data.

I think this data will indicate to you that the milled material will decompose more quickly but then it drops off very quickly to relatively inert production. In other words, the leachate will come out, but it will have relatively few contaminates. This is in contrast to an unmilled or unprocessed refuse landfill where it will take a fair period of time before it will really produce leachate actively. But that rate of production will continue over a longer period of time.

So my feeling is that it's not a matter of whether you get leachate or how much you get, it's a matter of when it comes. And this is the real decision with regard to milling.

James Fibbe: I wonder if you would comment on land usage of milled waste versus regular sanitary landfill.

Robert Ham: From what I've seen and heard about, I still wouldn't build on it. I think this is first and foremost.

The people who do have long-term experience, and now we're talking of the British and the French primarily, will tell you that the milled refuse landfill will stabilize more quickly and that there will be less total settlement. And we have experienced this to be a limited extent in Madison. We just don't have the experience at this point.

I think no matter whether it's milled or not milled, whether it's composted or incinerator rejects, or what-have-you, I still wouldn't build on it. Let's use that kind of thing for parks and so forth. I wouldn't look at that as an astounding benefit from milling at all.

Eugene Wingerter: But you would advocate the same land use patterns as for conventional sanitary landfills.

Robert Ham: Exactly.

Elmer Cleveland: Some people quote figures of up to 30, 40, 50 percent extension of life of land disposal sites by using milled waste. Would you like to comment on that?

Robert Ham: I really appreciate that question and this gives me a chance to knock hard at people who I think inflated project results and other experience all out of proportion. I have seen printed literature which said that you get 75 percent volume reduction from milled refuse. This is baloney.

Depending on how you measure it, I don't think that kind of thing has any bearing at all. Maybe you can get 75 percent reduction by going from the material coming out of the packer truck and putting it in the milled refuse landfill. Maybe it'll work under those conditions.

Anytime somebody cites volume reduction I automatically discount those figures. Instead, let's look at dry density. That really is what counts, and our studies indicate, and it's pretty well corroborated by European experience, that you will get at least 15 percent increased density with milled refuse, and up to 50 percent. This will depend in large part on how thinly you lay the material out, how it's compacted and so forth.

We've done a fair number of density studies which indicate that the vibration as much as the weight causes compaction. And furthermore the more compaction provided, the heavier the piece of equipment, the more closely will the density of unprocessed and milled materials come to each other. You get a much greater percent savings if you have loosely compacted refuse.

R. E. Dorer: What about gas?

Robert Ham: Gas is produced. No question about it. And my feeling is that this is an area where the milling concept offers a very concrete advantage. I don't feel that strongly about some of the other areas and this density question is one of them.

What gives us a gas problem is if we have pockets of gas that build up and are not allowed to freely escape to the atmosphere. Now we're going to get gas production irregardless of whether it's milled or not. If you have a milled refuse landfill where you have not broken up the landfill into pockets with daily cover, you now have a good mechanism for easily transporting of gases away from the site and, to me, this is an advantage. I think you will have a hard time having lateral migration.

Once the refuse degrades to the point where it looks like soil, this is something else again. And if you'll note in the things that I mentioned that need to be done, I mentioned that we need some more information on the characteristics of aged milled refuse, and that's one of the things I'd like to look at.

Cameron Friend: You stated that the farmers were using some of this milled refuse in France, did you? This is question one, and question two is what type of material were they using? Was there any value, fertilizer value, out of it?

Robert Ham: I gather that their main rationale was to put it on vineyards where they were having an erosion problem. A vineyard is ideally weedless with a lot of raw exposed soil, and if this is on any kind of an incline you get run-off which carries away the topsoil. And this seems to be the main rationale for use in France.

Now there are other parts of the country and other parts in Switzerland and other countries, I should say, where the material is not being used for that purpose. It does not have much nutrient value. And I would have to consider it just as we consider compost as, if anything, a soil conditioner and not a fertilizer.

LANDFILLING OF BALED REFUSE

William Faulkner*

Synopsis

Mr. Faulkner said that his firm had spent $3 million over the past six years on research, development, and demonstration work to achieve the successful commercial application of high density baling to dispose of solid waste. Over the past 18 months, the company's plant at St. Paul, Minnesota had baled and deposited in a landfill over 110,000 tons of residential and commercial solid waste. The baler used weighs 750,000 pounds and is housed in a building 120'x240'. Every 90 seconds, it can produce a 3,000-pound bale that is consistently 3' wide by 3' high and is normally 4' long, depending on the consistency of the materials being processed. Nominal density is 65 pounds per cubic foot. The bales are trucked to the company's landfill in 25-thousand-ton payloads and are stacked in tiers. The State has waived its requirement that cover material be placed daily.

Mr. Faulkner stated that, at its production rate of 800 tons per day, the plant's capital cost is one-sixth that of a turn-key incinerator facility and one-half that of a shredding installation; operating costs are one-eighth and one-half, respectively.

The slide presentation depicted pre-baling handling procedures, the baling process, loading bales on trucks, unloading techniques used at the landfill, and the emplacement of bales in tiers. Operations under varying climatic conditions were illustrated.

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*Vice President, American Solid Waste Systems, St. Paul, Minnesota

EPA BALED LANDFILL DEMONSTRATION

Ora Smith*

We got involved with the City of San Diego back in, oh, around 1967, back when the Solid Waste Office had its unsolicited demonstration grants program. We funded a feasibility study at San Diego to look into the feasibility of installing a baling plant and operating a bale fill.

And as a result of this study, we funded a demonstration project to build, operate, and evaluate a baling plant and the bale fill. The project started in the summer of 1969, I guess, and the plant became operational with a dedication ceremony in the late summer of 1971.

Since then the plant has been operating more or less daily. There have been a lot of the anticipated de-bugging problems which I'll talk about. So far the total Federal support to the project has been about $500,000. The City has contributed an amount in excess of half that much on top. This covered design, construction, and operation for this entire period. The capital cost of the facility itself has been around $350,000.

Daily cover is provided. The bales are generally stacked up in two-high lifts. The bales, incidentally, are 30 by 40 inches in cross section and the length varies somewhat but it runs between 72 and 80 inches most of the time. It depends on the composition of the waste. The thing that determines the length of the bale is really just how tightly you compact the stuff in a given number of strokes. The bale densities have been running right around 60 pounds per cubic foot.

One of the major questions to ask about baling is why should anybody bother to bale at all? And there are some obvious reasons why and there are some not so obvious reasons why. The obvious reason why is that it's difficult to get 60 pounds per cubic foot density in a landfill with any kind of mobile compaction unit, whatever it is, a steel wheel compactor or a bulldozer. We've heard the number 1200 pounds per cubic yard come up and everybody sort of breathes deeply when they hear that, because that's a pretty high landfill density.

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*At time of presentation, Chief, Mechanical Processing, Office of Solid Waste Management Programs, U.S. Environmental Protection Agency.

There is also the advantage of the transportation advantage, which Bill talked about, in that here you have something that's much denser than you can get in any other way.

He did show, though, that there's sort of a questionable advantage when you have truck haul, because it's real easy to exceed the gross vehicle weights and get yourself a ticket from the Highway Patrol. It could be an important part in rail haul, though.

There are also aesthetic advantages in much the same way that there are with shredded waste. It's just generally nicer to be around baled solid waste than it is loose solid waste. There's a reduction in odor problems, in blowing material problems, and there apparently is also a vector reduction, but that is something that still needs to be evaluated in different climatic conditions than San Diego's.

Another advantage is that it doesn't cost very much to place a bale in a bale fill. It's a fairly simple procedure.

Some of the not so obvious advantages are that we have suspicions--maybe they're not so obvious disadvantages--we have some suspicions based on preliminary work that was done mostly by the Solid Waste Research Laboratories of ORM that bales are somewhat different in their behavior, in their decomposing behavior, than either shredded, compacted, or plain old compacted solid waste. All the studies that have been done so far have been closed-system studies where you take a bale and put it into a tank of water and you look at what happens. This is not representative of the way things are in a landfill or the way things are in a lagoon disposal situation.

All we know now is that when you put solid wastes, plain solid waste, and then you put baled solid waste in a tank of water you get some fairly marked differences in behavior. We hope to be able to do some evaluations in the near future in actual bale fill situations to try to find out exactly what those differences are and whether they can be used to advantage in solid waste management.

The bale fill evaluation at San Diego will consist of gas and leachate, if any, monitoring because as you know San Diego is a very arid area and it's unlikely, barring a tidal wave or something, that the bale fill is ever going to reach field capacity. But we do have a leachate collection system installed and we'll look for any if it appears.

We also will be taking settlement readings. The information available so far is very small, in fact, there's hardly any information at all on bale fill behavior other than just qualitative judgments from people who have been on the site. That's because of the very small tonnage that's been placed so far.

In the most recent month for which I have data, in August of this year, they baled about 900 tons. The design capacity for the plant is 150 tons on a six-hour day. That was the design figure. We haven't been able to reach that yet. There have been a number of reasons.

In the first part of the operation there was the standard de-bugging stuff, you know, lines breaking and fuses blowing, this kind of thing. There have also been quite a number of problems with the hand tying operation. The separator blocks that are installed between the bales have caused a lot of trouble because they tend to squash down and catch the lines and the guys can't stick them through, and if they get them stuck through, they can't pull them out after they get them tied. There have also been a lot of problems with ties breaking, but a new alloy for the tie wires has hopefully solved this problem.

There have also been conveyor problems. Clarence Kaufman, the Project Director, is right now undergoing taking on some modifications to speed up the apron conveyor into the shredder and the bucket conveyor out of the shredder to try to increase plant capacity. We are pretty confident that we are going to have it up to design capacity by the early part of 1973, say in January or February.

The projected operating cost when we get to full capacity for the whole plant, including amortization, which is 20 years for the building and 10 years for the equipment, is $4.76 a ton. We've broken this down with 66 cents a ton for the feeding part of the operation, $1.17 a ton for shredding, $2.21 for the baling, 44 cents for the haul to the bale fill, and 28 cents for the disposal.

The shredding cost sounds very low compared to what we have experienced before in other shredding operations. You have to bear in mind that the shredder shares other systems in common with the rest of the plant. In other words, you don't have a shredder facility over here and a baler facility over here. You have an integrated unit. So there are savings, because things are all there together.

Now the actual operating costs to date have been somewhat higher because of reduced utilization of the plant. For the month of August the cost per ton was $12.56. But you have to bear in mind that this is operating at a third of the plant capacity.

So far our scale, our through-put versus operating cost, has stayed on the projection line, pretty close to it and I think that we're going to be down below the $5 per ton figure when we get the plant running full tilt.

I guess you might be interested in any final reports that are available. There is a report which has just been sent to the National Technical Information Service which is a report on the feasibility study that was conducted back in '67 or '68. This should be available in the near future.

There probably won't be any formal reports available on San Diego until--on the demonstration project itself--the evaluation is finished and we have an evaluation program of one year's length from the initiation of full-scale operation. So that's in the future.

I thought that what Bill said about the water absorbing characteristics of the bales was kind of interesting because with the shredded bales, at San Diego we found the opposite, that they absorb water quite readily. I don't know what accounts for this difference but apparently it's there.

We hope, as I said, to get involved in more extensive bale-fill evaluation programs in the future. We would like to look in some detail at the behavior of bales in a real landfill. We would also like to do some more work with baler economics and management information and systems and cost accounting systems for baler operations.

QUESTION AND ANSWER SESSION

John Ruf: Now the densities were quoted for baling as 60, 65 pounds per cubic foot. I'm sure this is right after baling. There's some swelling after baling and when you stack the bales, there's considerable void because you cannot stack them perfectly. Now, is there any explanation of the end landfill densities, how much void you have between stacking:

Ora Smith: We've done void measurement tests at the San Diego landfill and the void space there is less than two percent volume. The spring back is very limited in the tied bales. The only spring back that occurs is around the corners of the bales.

I don't have any quantitative information, do you, Clarence?

Clarence Kaufman: The spring back from the time the material is originally pressed in the extrusion chamber and then the time it comes out is about six inches, but this is all absorbed by slack in the wire. After that the wires retain it.

Ora Smith: Our traditional measurements are made after the spring back occurs, I mean the bales are weighed sometime after they come out of the baler.

William Faulkner: In an unstrapped, unencapsulated bale fill like ours there are some voids mechanically where the bales have been placed adjacent or on the top. Of course there is no movement with one right on top of the other. We find that with a couple of inches between bales, in about the first three weeks the bale will grow into that void. If there's no void there, the bale doesn't grow.

We've had survey stakes in bales six years old and they haven't moved in an elevated or up condition. We have an old working face in our fill that is maybe four or five months old, it's as solid appearing as that wall, you can't really tell one bale from another except maybe for a color line.

Dr. Carl Wolfe has done laboratory tests in this area. He's not associated with our firm or our concept at all as we are running it. He says that 1800 pounds per cubic yard is a realistic density in the fill with these bales.

J. B. Druse: You mentioned that you had a leachate collection system. Would you mind just giving us a brief on it?

Clarence Kaufman: We installed a French drain type of system for collecting this leachate in the bottom of the canyon which then drains down into a concrete headwall so if the leachate does permeate down through the bales, it can be collected at that point.

As Ora mentioned, our rainfall is very small in San Diego. Last year we received a total of five inches; ten inches is the average. So we really don't expect to get any leachate through the fill.

At the present time, the depth of our fill is approximately 25 feet or so, so with the experience we've had of the absorbtion of moisture into these bales, we certainly don't expect any of it to leach through.

J. B. Druse: Has American Hoist had any leaching problems?

William Faulkner: We find, and the slides show, that the water stands stop or adjacent to the bales. We have visually experienced no leaching problem. We have not investigated it. Again I can only relate back to some of Dr. Wolfe's experimentations. He said in a 950 pound per cubic year sanitary landfill he experienced a percolation rate of 43 feet per day through the refuse. In the high-density bale that he experimented with he found two feet per day. There certainly is some small amount of leachate going to be generated with the presence of water. His statement is that it's highly reduced in its rate of generation.

Ramesh Shura: By listening to the practical demonstrations today, I have a couple of questions and one is regarding the leachate. If you use some kind of a lime layer and also probably a coal as absorption for eliminating the leachate problem as well as the baling experience; the experience in carting them there; the bulk is reduced to a very, very high density volume. Is any of this experience similar with any kind of solid waste management project in terms of the assessment aspects? What is the similarity of these concepts, if at all? Have you ever tried?

Ora Smith: I'm not sure I understand the question.

Ramesh Shura: Dr. Ham indicated his interesting experience about lime in England. Now, with the lime and also maybe a coal on the operation, could this, if you're going to use landfill under the new regulatory procedures--I realize that it might increase the cost by imposing some kind of artificial layer in the actual landfill. Now by doing this what kind of impact might we have on the pollution aspects? The second question relates to the baling. And that is, since we already have experience in carton mills, reduction of the volume of the carton in the various presses, and that experience can be readily applicable to minimize the cost in terms of the assessments, is that experience being utilized or looked upon?

Eugene Wingerter: Let's take that in two parts. I'm sure the people in the back couldn't hear the question. The first question is related to the use of synthetic membranes to isolate or insulate the bales and milled refuse from the underlying soil conditions and the role of that.

Ora Smith: We've done no work involving capsulating bales. We have received reports from a Japanese organization which encapsulated bales in asphalt. Apparently capsulating bales in asphalt is only a temporary sort of measure to improve the odor, or eliminate odor problems around storage areas.

In regard to plastic film encapsulation, or anything like this, we haven't done any work in this area and as far as I know there are no plans right now to do any. We have no recommendations to make regarding that now.

Charles Scott: Did I understand him to--we're into the possibility of laying a film membrane on each lift, is that what he referred to?

H. Lanier Hickman: What he said was lime and coal. He's talking about going to the bottom of the fill, I assume. Putting down lime and a coal to serve as an attenuation agent for leachate, similar to the chalk instance that Bob Ham saw in England and showed a slide of the cut gap fill used in the control of leachate.

William Faulkner: At the baled fill in St. Paul, we cleared down to a 15-foot thick, relatively impervious clay stratum which is about 15 feet above the groundwater, and this is a barrier for any possible minimal... Does this help?

Charles Scott: That's better.

William Faulkner: This 15-foot thick clay stratum is, I think, what you're alluding to as a barrier to any potential leachate infection of the water. And the minimum quantity of leachate that might be generated in a baled fill, and certainly in that fill, depends on finding this clay barrier before the leachate can get into the area of groundwater or surface water.

CONSIDERATIONS FOR RAIL HAUL LAND DISPOSAL PROGRAMS

David Blomberg*

I was pleased when I looked at the program that they didn't talk about rail haul and then say, "This talk is entitled 'Much Ado about Nothing'." Because there's been so much conversation and so many aborted efforts and so much money spent down through the years on rail haul.

To my knowledge, as of today, there is not a program of any magnitude in operation anywhere in the United States. My major theme today is that in the foreseeable future we will see major rail haul movement of waste developed within the United States.

We feel there are some 65 major metropolitan areas in the United States that today generate enough tonnage to sustain a realistic, economic rail haul program. By that, I'm not saying there are going to be 65 rail haul programs developed, but in a certain percentage of those cases I'm sure that within the foreseeable future we will see rail haul movements of solid waste.

Why do we say this? First of all, many, many major cities throughout the United States are faced with a real crisis in the disposal of their solid waste. The incinerators are being closed or subject to being closed in many areas. The cost of new incinerators is very, very high. The cost of operating an incinerator is high. And so they're looking for another direction in many, many cities.

In other areas where they're using dumps or landfills at the present time, the facilities are filling up rapidly or they're being closed by various governmental agencies. Cities such as Chicago and Cleveland and other major cities are surrounded by a suburban ring and they do not look too kindly upon the garbage of a major metropolitan area coming into their fine communities. Consequently, the city is faced with the problem of bringing that material from the inner city, from the city proper, to some disposal site at some distance from the point of collection.

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*Manager, Solid Waste Systems, Waste Management, Inc., Oak Brook, Illinois

The cities are also faced with another problem, the cost of land is going up so terrifically that even if they were able to get a disposal site, the economics are getting more adverse all the time.

As this distance from point of collection to point of disposal gets bigger, some type of transfer program must be initiated, and there are three basic ways in which this can be accomplished.

First you can haul it out, as we heard yesterday in Harold Smith's presentation. True, a truck transfer facility is a very realistic, good, practical way of getting waste moved from a central city out into some other area. Secondly, in some parts of the country it's feasible and practical to consider the barge movement of solid waste. In many areas of the United States this is completely impractical, of course. The third alternative is to move it out considerable distances by rail. Now when you talk about a rail movement of solid waste or a rail movement of anything I think we have to give some consideration to the basic structure of a railroad.

A railroad is capable of moving freight at considerable distance at a rather low cost. I say they're capable of doing this. Kind of a rule of thumb, and I don't maintain that this is fact, but a kind of a rule of thumb is that if you can move it 20 miles by highway then you could probably move it 100 miles by rail. So that gives you a much broader perspective of where you can dispose of this material.

Another interesting situation is just the basic fundamental differences between trucking and a railroad operation. If you go from 10 miles to 20 miles by truck, in general terms your cost doubles. If you go, let's say, from 100 miles to

200 miles by rail you have very little added cost, just because of the inherent difference in fixed cost and variable cost between a trucker and a railroad.

What are some of the conditions that are necessary for a rail haul program to develop? Many of these represent a personal opinion and I don't present them to you as being facts.

First of all, you have to have sufficient tonnage per day. It becomes impractical to talk about moving low tonnages by rail. The economics just defeat you. As kind of rule of thumb, about 1,000 tons a day represent a realistic minimum. This isn't to say that under certain conditions it can't be done with lesser tonnage.

Another essential ingredient, if you're going to develop a rail haul program, is that you have to have an interested railroad. Now I always put railroads in connection with these programs in one of three categories. Some railroads are difficult to work with. Some railroads are impossible to work with. And some railroads are progressive and have an active and vital interest in working with people to develop rail haul programs, and they will give you the help and the support you need in the development of one of these programs.

In some situations, in some areas, if you're served by some carriers it's a waste of time to even start, because they're going to shoot you down every chance that they get.

One of the ways a railroad can indicate to you very clearly its interest in the development of a rail haul program is by the rate per ton that it offers. These rates, from my experience, vary all over the ballpark. I have had rates quoted to me on movements--in one particular case, 130 miles--and the railroad indicated great interest and cooperation, great interest in getting involved in a program, and they quoted a rate of something like $5.32 a ton and couldn't quite understand when I said, "Well, I thought we had a bid for the contract at about $6.50, and that didn't leave much room for us." They thought I was from outer space.

That isn't always the case, though. In another situation, a railroad offered a 1,000-ton-a-day program, moving the material some 250 miles, and offered a rate of $2.52, roughly one penny a ton mile, which is a nice working area. You can move under those conditions 100 miles for about a dollar a ton.

Some railroads are willing to talk in those terms, and others are completely unwilling to even consider it.

Another interesting rate, just to throw some of these figures out to give you a feel for how they look at these programs, a program again of 1,000 tons a day guaranteed for 10 years, movement that by highway would be 52 miles was given a rate of $2.50. Actually that was a very excellent and a very good rate. It involved a major carrier that was the result of a merger of two large railroads. But somehow or other, over the years they never managed to put their crews together. And so you're really operating with crews on one railroad that really were part of two railroads and in moving 52 miles by highway they had five crew changes. This brings another important consideration into focus and that is that distance is not always the only criterion on which the rail rate will be based. The number of crew changes and things of this type can become far more important than the actual distance that the freight is going to move.

A railroad can also indicate its interest to you in developing a rail program if it is willing to talk to you in terms of a unit train. Many, many railroads indicate an interest in programs of this type until you bring up this point and generally speaking their representatives will say, "Well, No. 7 goes from A to B and we'll tack those cars on No. 7."

Well, I think that's the start of your downfall, because they'll tack it on on Monday, Tuesday, and Wednesday, but then they have a lot of tonnage on that train on Thursday and what are they going to leave off, they'll leave the garbage off. Then you're at the other end, you're trying to operate a landfill and you have no material coming in.

This isn't to say that it cannot be done in non-unit train service but it becomes far more difficult and there are far more hazards than when you can get them to schedule a train that's going to be pulled out of your transfer station at 8 o'clock at night and they'll guarantee that it'll be at the unloading site at 4 o'clock the next morning. You can schedule and plan and develop a good operation under those conditions, but if you're not sure when that material is going to show up, it's difficult to structure a low-cost, efficient disposal operation.

Another thing the railroad can do is to give you a good schedule. If you're going 130 miles and they say that it's going to take three days to deliver it, you have some real problems on your hands.

I can think of one of the major carriers in the United States that we've done some work with on a movement of some 87 to 90 miles at a quoted rate of about $1.05. Now you start to plug in $1.05 into some of your cost analyses and you can see that you can start to move waste at a considerable distance economically.

One of the things that has to be done, however, is to develop a system that is feasible both economically and operationally. Perhaps I've been pointing my finger at the railroad a little bit, but I see a lot of programs that people are talking about, that they want to go to the railroad and talk about, that just are unrealistic from the railroad's point of view.

You have to do something to that solid waste in order to achieve the approximate payload of that rail car. You can't take a car with 100 tons of capacity and expect the railroad to haul 40 tons on that car. You have to do something to increase that payload, whether it's baling or compaction of some kind, but something has to be done to get a good payload on each rail car.

Another thing that has to be done in working with the railroads to develop a feasible program is to not ask them to provide special equipment. If a railroad's on the verge of bankruptcy and you come in talking to them about a special rail car that's going to cost $30,000 each, they're just not going to provide it. If you want to provide it, that's something else. If you're going to talk to a railroad about getting into an operation, it better be with the type of car that they have available and this, then, can sometimes dictate what system you will employ.

In addition to this, you have to have a large rail-oriented landfill. Programs of the type we're talking about, 1,000, 2,000, or maybe more tons per day, represent a tremendous capital investment and you can't get involved in a program where you have relatively limited landfill capability.

Another point, I don't think the landfill you go into on a rail haul program can be marginally acceptable, because whatever the laws are, whatever the rules are today, I think we can count on one thing, and rightly so, that they're going to be more stringent, more strict, more definitely enforced in the future. So if you go into a long, large-scale program, you'd better make sure that you're going to be able to operate that site for many, many years to come.

Another ingredient on a rail haul program is you have to have a municipality that is willing to sign a long-term contract to put one of these programs together. Now one of the interesting things yesterday was a little bit of a controversy that developed here between private enterprise and the public domain.

I think a rail haul program is unique in that it really brings into focus the necessity for co-operation by the private sector with the public sector, because I don't feel that either sector can put a program of this type together by itself. It takes some close cooperation between both sectors in order to put a program of this type together and there has to be give and take on both sides of this.

What about sanitary landfills for rail haul? I'm just going to run through this quickly. Actually, the opportunity, despite what has happened in the past with so many aborted efforts, actually the possibility for developing a landfill rail haul program is much easier to develop than is a landfill for a truck program.

If you stand before a citizens' group, which maybe doesn't like your presence in the first place, but you talk to them about one train a day coming in and one train a day leaving. That they can understand. Because one of the legitimate complaints about any landfill anywhere is the amount of truck traffic going in and out. And so you have overcome one major hurdle. And when you can talk to them about sealed closed cars with just one train a day, this does a lot to help you in the development of a rail program.

The other thing that rail does for you, because it expands your horizon distancewise, is the fact that you have the opportunity of using marginal or bad land of some type that can be reclaimed.

As Mr. Berman mentioned yesterday, in strip mines you have the opportunity of talking about a land reclamation program, not just a way of getting rid of some big city's garbage. That's fatal. Because you're saying, "I want to bring my garbage into your home." One of the areas that has great fascination on a rail haul program is the development of sanitary landfills in strip mine areas. I just did a little bit of work on where these areas are. I was, frankly, a little startled.

There are active strip mine activities at the present time in 22 States. Using a crude estimate, there are probably 150,000,000 people or 75 percent of the population of the United States that live within 250 miles or a reasonable rail haul distance of a strip mine area. And that is really kind of staggering. Seventy-five percent of our population is in general terms within 250 miles of an area where there is strip mine activity.

I think this opens up a tremendous horizon. I realize there have been so many aborted efforts, but there's going to be someone who is smart enough and good enough and wise enough to put together some massive rail haul programs that are going to use and reclaim these blighted areas.

I'm running over on my time and so I just want to bring it to a close by saying, in our opinion at Waste Management, rail haul does represent an excellent way to solve the disposal problem being faced by major cities throughout the United States. The climate for putting these programs across is becoming more favorable every day and it's up to you and me to work together to see that these programs get put across.

EPA PLANS FOR RAIL HAUL DEMONSTRATION

Clyde Dial*

I decided to split this into two parts. One, I want to discuss our beliefs about rail haul and what we have done in terms of supporting a demonstration for rail haul.

I want to precede that by giving you some of our opinions of why rail haul is a good thing--Dave covered a good bit of that.

In discussing our plans, I'd say they're optimistic. By that, I mean we're pretty well convinced that somewhere within this country in the not too distant future there will be a system operating where solid wastes are transferred by rail.

We have a lot of things going for us, I think, that are going to help us achieve that objective. In the first place, as Dave pointed out, many cities are really going through a crunch right now on what to do--major cities are faced with what to do with their solid waste.

Besides the points he made, the environmental pollution codes and standards are beginning to become more stringent and tougher. And this, coupled with the escalating costs of labor and equipment and construction of various facilities, is all going together to help facilitate making rail haul a very viable alternative. Of course it's very dependent upon the locale you're trying to place it in.

The large urban areas obviously don't really have the luxury of having a lot of close-in land and in a lot of cases where they have the land, the use of that land for the disposal of solid wastes really is not completely compatible with the concentration of people that surround that land.

As these systems are being pushed--the locations of the sites are being pushed farther and farther away from the center of cities, the feasibility of transporting it by some method, rail being one of those, certainly becomes more viable.

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*At time of presentation, Director, Systems Management Division, Office of Solid Waste Management Programs, U. S. Environmental Protection Agency

The concept of rail haul, as I'm sure all of you know, is really not new. Early in '65, or a lot of it as early as '65, there were many attempts principally either by selected cities, which in all cases failed, or by the rail companies themselves trying to instigate and begin a program like this to get one of these systems operational. They all just didn't pan out. I think the major stumbling block was public acceptance. I think the name of the game in terms of rail hauling is public education. I don't think there's a technical problem associated with it, and under the given and correct situation, it's certainly not economic.

No one wants to be the garbage dump of a major metropolitan area. There are a lot of places, I think, that would benefit by being a garbage dump of a major metropolitan area, however. I'd like to get into those benefits in just a minute.

But I want to restate some of the benefits to the generating city or the source city first. In terms of land use, obviously you can get the disposal site away from the high population area and use that land for perhaps the most productive use.

The economics in given situations certainly are very favorable now. A lot of cities have used incineration as a means of extending landfill life. They've also used it as an alternative to landfilling. We all know what the cost of incineration is, and it keeps going up while the costs of rail haul really aren't defined exactly yet, we're of the opinion that they're very comparable.

As Dave mentioned, we had a study done that showed that about 50 miles is the break even point of the trade off between truck transport and rail systems. Well, I think all these costs in terms of the trade off of one system versus another or both in terms of the actual operating costs or in terms of transportation costs are very dependent upon the situation of the given locality and you can't really make general statements about comparative costs. It takes a lot of effort to really make that hard decision on whether it's the proper thing to do for a given situation.

From the pollution standpoint, if the source city would use rail haul and it happens to be using incineration, it obviously can get around particulate or gaseous emissions control and eliminate any contamination of groundwaters or surface waters from the process water of the incinerator.

Finally, rail haul eliminates a lot of day-to-day operating problems for the community. They aren't really faced with that continuing problem of trying to locate additional disposal sites. They have a very defined capital expenditure situation on their hands in terms of equipment, et cetera, once they begin the system.

Now, those items are a benefit to the source cities but I don't think that's the real key question to this whole concept. It's the receiving area that really has control over the situation.

In our opinion there are many benefits for the receiving area which proportionately far outweigh the source city's benefits. In the first place, they can add a lot of jobs or at least a number of jobs to their local labor force, both at the rail head transfer station, which there undoubtedly has to be, and at the disposal or recycling facility that might be at the end of that system.

The large scale of this operation can be a real benefit to them in terms of helping them eliminate the inefficient and perhaps substandard systems that they have for their own disposal. In other words, they can team up with the system that's coming in from the major metropolitan area and use that facility for the disposal of their own wastes.

Economics comes into play if they choose to charge a royalty on the waste that is coming in. If you take a situation where you have 1,000 tons a day operation five days a week, a 25-cent royalty constitutes about $65,000 a year. Now that can be a lot of money to a very sparsely populated area.

In addition to that, the taxing base in terms of land values go up, and I think that it obviously increases the capitalization base for other needed county or local facilities.

Finally, from an environmental point, they can certainly reclaim land. The recovery of strip mines, scarred lands, deserts, any submarginal land is certainly a very real possibility. In strip mine areas, for example, they can restore it and again it will support vegetation and wildlife and they can essentially fill up the holes when right now there's no prospect of that situation happening.

At the same time, tied in with this land correction or restoration, you also can get at the problems a lot of these areas have with acid mine drainage, because in establishing a proper sanitary landfill process, they're going to control the drainage through that area and essentially, if not totally at least partially, eliminate the problems they have in many of these mine areas in terms of acid mine drainage.

We're very optimistic about the potential application of rail haul for solid waste. We believe that the key thing that needs to be done is actually get a system operating to demonstrate that it is an acceptable neighbor, so to speak, and that it is viable from an economic and technical standpoint.

In this regard we solicited applications for rail haul projects back in 1971. The response to that solicitation was somewhat disappointing, mainly because the applications that came in were either along the lines of looking at the feasibility of establishing a rail haul project for a given area or they were construction grant oriented. They either wanted a lot of capital money or they wanted to do a study, and what we really were after was to get a system operating without supporting a lot of capital expenditures.

We negotiated with those cities and a lot of others that showed an interest after that solicitation and again formally solicited in June of this year. Now, in that solicitation, we had what we felt were fairly well defined criteria which the applicants had to meet.

Some of the major criteria were the fact that we wanted a system that would handle at least 500 tons a day and that preferrably transported the waste 100 miles. The key thing on that point was that the disposal facility or the end point of the system would be outside the political influence of the source city. And, finally, as Dave mentioned, we would insist that the actual disposal operation be an environmentally acceptable operation and comply with all the standards that are in that area.

Now to get down to the point, well, what have we really done. As a result of that solicitation we have awarded a grant to the City of Cleveland for $530,000. That grant is phased in two parts.

The first part is the three-month period during which the city officials must secure an acceptable series of contracts to get the project underway, such as obtaining a site, negotiating and obtaining a contract with a rail system, and obviously, locate a disposal point. They guaranteed us, in the terms of the grant, that they would haul 500 tons a day. Their system is going to be designed for about 1200 tons a day, and we actually anticipated operating more closely to that figure than the 500.

The exact details of the system are really not completely clear yet, for good reasons. They're going to solicit bids.

They're going to put out bid specifications and solicit bids on their system, but basically they envision their system to be taking an existing incinerator on the west side of the community and converting that to a truck transfer facility. They'll transfer the waste from that facility to the east side of the community where they have yet to locate an actual site.

If you're familiar with Cleveland, you'll appreciate the difficulties that might present to them. They have three months to do that. Assuming they're able to get a site, they're going to establish a rail transfer station in which the waste will be baled, placed on the cars, and sent about 120 miles away to a strip mine area.

Our grant support provided support and financial assistance really in four areas. We paid for the management personnel costs associated with the rail haul system. We are paying for systems evaluation by consultants and the detailed engineering of the transfer facility, and finally the cost of a public relations program to try to sell the concept.

It's our firm belief that unless one of these systems can operate on its own financially, stand on its own financially, it should not be implemented. Consequently, our grant support in no way supports the construction or operation of this system or equipment purchases associated with the system. The main purpose of our demonstration is really two-fold.

First, we want to put our support behind the source city, in this case Cleveland, and try to help them sell the concept and be able to accomplish and get over all of the social, political and public relations barriers which have historically stymied the start of one of these operations.

Secondly, we want to provide an unbiased evaluation from an economic and technical standpoint so that if other cities desire to at least consider rail haul as an alternative, they will have an unbiased documentation and analysis of a rail haul system, an actual operating system.

We believe that that's going to be a lot better than having a rail company try to sell them or anyone else outside that might have a vested interest in trying to sell them on a concept.

Just to put it in perspective as to when you might see a train rolling out of Cleveland, the contract documents have to be completed by February of '73. Following that they're going to have a construction period and it's a complex project. It seems like a short period of time here, but there are other things happening before those actual contract documents are developed that are unrelated to this project directly, but have a relationship indirectly. Nevertheless, the system will be constructed by June. In August of next year they will begin a 12-month operation-evaluation period. So theoretically, and hopefully, within about a year and a half we should have a rail system operating.

To summarize our feelings, we certainly believe that rail haul is almost inevitable as a solution to major metropolitan areas for many reasons.

First, the close-in land values are such and the difficulty in obtaining this land, this is going to force cities to go beyond where they are right now.

The economics of the system are certainly comparable to many other environmentally acceptable systems today. It's not competitive with some of the systems major metropolitan areas are using today, but it is competitive with environmentally acceptable systems.

The disposal of the waste in barren land such as strip mines or deserts or whatever, we believe is a very real factor, because this land in itself, by being reclaimed, is going to accomplish something that's going to be very, very beneficial to the country and to the receiving area.

And, finally, the long term prospects of being able to facilitate some type of resource recovery operation is probably enhanced because with a system like this, they're not going to go unless they get large quantities of waste. If the economics, or the markets I should say, turn out to be proper you could facilitate a recycling operation.

To summarize it, we just hope to demonstrate that the concept of establishing a rail haul system is a very viable alternative to major metropolitan areas in solving their problems.

QUESTION AND ANSWER SESSION

Samuel Johnson: I'm from Kentucky, the State that's the largest coal producer in the nation and has more areas and acres of strip mines in the country. Our Water Pollution Commission has said absolutely no to the use of the strip mines, absolutely no. And I agree with them after seeing the problems, working with small sanitary landfills in the strip mine areas, I couldn't agree with them more. I don't think we want your waste at all in Kentucky. Consider that when you start putting it on the train, because we don't want it. We've already found out it doesn't work in the strip mine areas.

J. B. Druse: This question is for Mr. Blomberg. Have you made any projection or projected cost studies on the total costs, because you've got a transfer station on both ends?

And, secondly, some year and a half or two years ago your company was successful in getting a contract in the City of Milwaukee in competition with the Pullman Company who were fostering a rail haul system. I was wondering if you could give us a little quickie on that.

David Blomberg: Costs are going to vary all over the place. Everybody's interested in kind of a ballpark figure--what are you talking about, ballpark? I believe it's realistic depending upon the quantity of wastes that you're going to be moving. I think it's realistic for these programs to come in under $6.00 a ton. Under some conditions with sufficient quantity and from there you go on up.

Just to allude back to the time of the Milwaukee program. There was strong competition for that contract. There was another contract that was bid in Cleveland at that same time for a complete package program where there was absolutely no investment on the part of the community at all. It was all private capital involved. And that was 1,000 tons a day bid at $6.75 a ton for the first 300,000 tons and there was a discount of 20 percent for tonnage over 300,000 tons.

Now those figures are a little old and we've had inflation since then, but I think that kind of gives you a ballpark figure.

Robert Robinson: As far as the pollution control agencies in our State, I don't think we have any problems accepting solid waste in our strip mines.

The question I have for Mr. Blomberg is, in dealing with the railroads, do you find that when you cross State lines this is a problem, I mean from the I.C.C.? What problems as far as rates? The railroad, I understand, will be able to give a much better rate if you're only hauling within the State.

David Blomberg: I don't think that is the area of biggest problem. I think the area of biggest problem is some States take a very dim view of waste material coming from another area. You can get a good economic freight rate from a railroad even if you're going from one State to another. The problem is one of jurisdiction, one governmental agency versus another.

Eugene Wingerter: Dave, let me just ask a parallel question at this time. It's one that's come up a number of times recently.

With the inequities in the freight rates for transporting secondary materials versus virgin materials, do we have a similar inequity in transporting waste versus other types of high density materials such as stone or gravel?

David Blomberg: I hate to sit before 200 gentlemen and say I don't know the answer to that. I just don't.

William Culham: So far we've talked about baling as a method of preparing wastes for rail haul. Do you foresee any problems with shredded waste in transporting?

Clyde Dial: I think in that regard we, obviously, received more applications than just Cleveland. Some of the other systems that are still under consideration for possible demonstration grant involve systems other than baling, or other processes in addition to baling. It's a combination.

Just to give an example, some of the configurations which have been examined by ourselves or other cities include containerization, either with shredding or without shredding, shredding and baling, baling alone or just placing it in an uncompacted form, which I really don't think is very feasible, in come type of hopper car and then covering that to make sure it doesn't get away from you on moving trains. There's a lot of different type systems that are being considered and some of them do not include baling.

Howard Christensen: I have two questions for Mr. Faulkner. I'd like to know how far the end haul is in the baling system and if he would care to reveal the cost for the end haul and maintenance costs on the baling operation.

William Faulkner: The haul to the bale fill is 11 miles one way from the baling plant. The baled fill operator can actually put a ton a minute in the ground, two bales every three minutes. We've scaled that down conservatively to 35 tons per hour and operating costs, without the land considerations involved, equipment, hours, fringe benefits and so forth, are 65 cents a ton.

Howard Christensen: How about maintenance on the baler?

William Faulkner: I think that a cost study on these balers in scrap steel service shows a very--it sounds like a sales pitch--high degree of reliability utilization of 95 to 98 percent of the time in open service with scrap steel. A baler operator, and I can't recall his name, in Philadelphia recited an annual baler maintenance and repair cost of about $5,000. This is corresponding to our maintenance expenses, repair parts, and service to the equipment in St. Paul.

Edward Heil: Mr. Faulkner, I wanted to ask you, do you use ties on your baling?

William Faulkner: No, the bales are neither strapped or encapsulated. The refuse goes into the charge chamber, 5,000,000 pounds of hydraulic pressure in three dimensions, the bale as you saw in the off-loading ramp is--the density is obtained and continued in between 60 and 70 pounds per cubic foot without mechanical ties or encapsulations or adhesives.

Edward Heil: Do you have an actual cost per ton for the whole system?

William Faulkner: The capital investment in this plant in St. Paul is $1,300,000 without the cost of the land. That's turn key, building, concrete, conveyor, baler, mechanical, and electrical work.

On an 800-ton-a-day capability, two shifts, which this plant has in its capability, the operating costs, 10 year debt retirement at 9 percent interest with labor, labor overhead like vacations and jury duty and what-have-you, insurance on the facilities, power supply costs, the whole range of the cost that you would have in a comptroller's review of this operation is under $2 a ton, more specifically, about $1.82 per ton. That's loose refuse on the floor to a bale in a truck.

Edward Heil: How about in the ground, the total cost?

William Faulkner: Well, the trucking expense is three cents a ton a mile and I related the 65 cent figure.

James Mueller: You made the statement that you need not contain the bales. How do you recommend handling specialty problems such as tires or mattresses, or do you get these in any volume?

William Faulkner: Oh, yes, in fact Monday is mattress day. They all clean out the garage on Saturday and Sunday per orders from the high command and Mondays you come to our plant and you'll see that conveyor system loaded with a half-dozen mattresses.

We were showing this to a gentleman from the Greater London Council last week and the mattresses started coming. The one discipline in the frontend loader's operation is that he should put on there a reasonable mixture of the refuse we receive. Two mattresses and two tires got in one bale. He, kind of being shredder oriented, inhaled a little bit, but it did make a good bale. We pass these things through, tires, one to a bale is no problem whatsoever. If it's four to six inches inside the face of the bale you'll never know it's there.

If it's on the face of the bale, its memory may take it to the point where it will emerge out from the face maybe a tenth or a quarter of its configuration and then the refuse seems to grab hold of it and it's carried onto the fill and put away that way.

We like tires. We find a man can get a dollar a tire, so we process it through the baler without problems. Automobiles and demolition material make a fine bale. We had a contractor from a demolition fill ask us to bale 50 tons of pallets, plasterboard, shingles, furniture, tires, and they made exceptionally fine bales.

Richard Power: I have two questions. Number one, what's your maximum down time? Number two, how would you recommend treating the liquid that squeezes from the compression chamber?

William Faulkner: I think the first question was down time. We have a $12,000 spare parts inventory. If an electric motor burns out, we have one that slips in. Our down time has been ranging, to change a relay or limit switch or an O ring seal, you can program some of these in off working time. To replace a burned out motor in a conveyor or one of the large ones in the power system, about two to three hours. We have a surge area in the floor of the plant that is slightly under the two-shift capacity of the plant, between four and five hundred tons per day.

As far as liquids coming out of the compression chamber, in normal operations and normal climatic conditions without too much rain prevalent, we won't get over about a five gallon paint bucket full a day. The moistures in the refuse seem to stay within the bales, being impregnated from the wet into the dry particles. On an extremely rainy day with water running out of the collection trucks as they dump their loads, there will be more of this moisture coming out of the compression chamber under the heavy pressures.

Our present system, which seems to have incurred no one's wrath, is that that goes into the sanitary sewer.

THE NEED FOR LAND-USE POLICY

H. Lanier Hickman, Jr.*

Talking about land-use policy is about as esoteric a conversation in the United States today as talking population control. However, ever since man got up on his hind feet, off all fours, and decided that he was going to be the bull of the woods, man has wanted to own the woods, and that attitude is reflected in the way our country presently pursues the use of land.

Our pioneer forefathers who emigrated and settled in the United States came over for a variety of reasons--religious oppression, political oppression, economic oppression, but centered within all those needs to throw off oppression was a concommitant drive to own land.

And where we now have certain regulations that reflect our desires to protect the air, water, and the ocean, nowhere have we really addressed ourselves to the protection of the land--from the standpoint of ownership, right of use, future use, or whatever.

In the past when you bought a piece of land you also got the water and the air that went with it and the right to use it as you saw fit. But today's America provides safeguards to attempt to assure you use the air and water properly. But for some reason we've forgotten the land and the land is now the recipient of all the effects of our sins in the air and the water.

There is land demand inherent in air and water pollution control systems. That demand impacts on solid waste management systems and subsequently the land that solid waste management systems need. Yet there is no policy, really, at any level of government, committed to protecting the land. Yet, those of us in solid waste management feel that there is a stronger need for controlling land use than any other aspect of environmental control.

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At some time, somewhere in this country, in the near future, however, we will need to address ourselves to this problem as a nation and as a people. This country will have to develop a principle to utilize the land yet hold the impact (negative) to a minimum.

There is a good deal of current Federal activity in land-use planning and land-use concepts. HUD, for example, has 701 planning grants which are both general and specific plans developed and directed toward land use.

We have our own solid waste planning grants in Section 207 of the Resource Recovery Act. This type of planning is specific planning for solid waste management systems.

Yet both of these planning activities supported by the Federal government are directed toward plans that are developed primarily by agencies that have no mechanism by which to protect the land that they're planning to use, much less implement those plans to use that land in the way that it should be used.

Because of the way government is organized at the local, State, and Federal level, no one controls the land except the individual citizen, and it looks as though the citizens must decide whether we want to continue to let the individual citizen control the land when we've taken away from him the right to control the water and the air. And therein lies the philosophical constraint that we'll have to overcome in the next few years if we are to come up with a national policy on land use.

Given the present economic constraints in our country, the inflation that we face, the demand for the public dollar, there is an inherent desire and demand to utilize that land to bring in more money, not necessarily to protect the land. The Federal government recently considered legislation to establish a Federal position on land-use planning which basically placed the responsibility on State governments to assume land-use planning and regulatory authority over land use. This legislation did not pass.

Solid waste management is frequently not considered in land-use planning. Solid waste management is the last thing that they think about when they start blocking out land. Space is provided for new industrial plants, parks, single- and multi-family dwellings, schools, interstate highways, everything. And, then, maybe there is some mention in the plan down at the bottom of the last page of the plan that says, "And, by the way, you ought to have sites for solid waste management." "By the way!"

And of you who have read the general use kind of plans that are developed by our planning agencies would agree that this tends to be the normal practice of planning. And if solid waste management needs are considered, they are considered in a negative rather than a positive way. This land cannot be used for solid waste. Not: this land can be used, that land cannot be used. It's the same negative reaction that the solid waste management field faces in all aspects of its operation.

There's a reluctance to allow land to be used to accept solid waste and, yet, now that we're trying to move out of the Dark Ages of the dump, there's more concern over the sanitary landfill than there was ever over the dump which really pollutes the land. Few people are excited about the dump, but mention a sanitary landfill and everybody's excited--unfortunately, in a negative manner. Again, it's a reflection that no level of government controls the land. There is no one that makes the decision on how land should be used.

We are going to continue to need and have solid waste disposal sites because there's no magic black box that's going to make solid wastes go away. There will always be some residue requiring disposal on the land. We've got to secure disposal sites not only for now but for the future. There are some enlightened parts of our country that are securing disposal sites for use 50 years hence. Some, but not many. And we've got to hold this land in trust for future need. There has to be a mechanism by which land use planning and land use acquisition will allow for that sort of trust.

Perhaps local government can't do this. I don't know. The past track records would indicate that they can't or won't. Regional agencies because of the structure of local government are not implementers, they're not doers, except in unique instances. So, obviously, we need a level of government to exercise greater control and share in securing land for all purposes, including solid waste management. It's thus apparent at least to me that State government must get involved. States still retain the right of eminent domain.

Our Agency is doing everything we can to sell the concept of the use of land for solid waste management. It's very difficult, given a past track record of the solid waste management systems in this country.

All of us at this conference have spent two days talking about sanitary landfill; we've really talked about land use. We've talked about protecting the land from pollution. Land is going to be used and dumps are going to disappear. If we do nothing else in the next 15 years in this country but eliminate the open burning dump as a cheap alternative and as the out for solid waste management, we will have come a long way from where we were in 1965.

The dump is going to disappear and for this to happen, control of land pollution by government must start. Some level of government must protect the land from ourselves. We must decide whether a developer should be allowed to put up a high-rise or whether it is indeed more important that a piece of land be saved for solid waste management, not just for today, but for 10 years, or 15, or 20 years from now.

The sanitary landfill and its variations such as milled disposal sites and the baled fill, are going to continue to use and need the land, as we, as responsible citizens totally committed to an environmental ethic, must start to address ourselves to the demand for the protection of the land by a responsible level of government.

All of us will benefit from a strong control of the land. Because in the long-term final analysis, what all responsible solid waste managers are trying to do is to save the land, because there's nothing else left to us. Everything starts and ends with the land, not the water or the air.

Solid waste management systems must be operated in such a manner as to protect the land and we can start by operating responsible solid waste disposal operations.

The protection of the land from pollution must begin and it must begin now at every level of government if we're going to protect it for the future.

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